

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Corrugated Boiler Tubes and their Manufacture.

One of the requirements of the present day is a good, efficient boiler, occupying moderate space, containing a large heating surface, a good quantity of water, circulating well and permitting a certain range of expansion and contraction. Fox's corrugated boiler tube would seem a step in this direction. As will be seen from Fig. 2, the tube is corrugated circumferentially, an arrangement which, it will readily be conceded, increases the heating surface. This, together with the circumstance that the gases of combustion are retarded by the uneven surfaces of the flues, insures an increased utilization of the heat generated by the fuel. The circulation of the water is energetic, and therefore deposits and scale adhere less firmly and may be removed with greater facility. A chief advantage of the corrugated flue is that its form permits it to take up any expansion and to yield to any contraction, and that therefore the ends may be rigidly made. What might appear a serious disadvantage of the Fox flue is the difficulty of securing a sufficiently perfect weld in the boiler plates after being subjected to the severe strain caused by corrugating. To prove that this was not a ground of inferiority, a number of tests were made on a large scale in competition with plain flues. These showed that the corrugated tubes were far superior to the others in their power of resistance to pressure. In future it is proposed to make all welds by planed scarfed joints, lightly riveted and then welded.

The machine with which the corrugations are made is very simple, as Fig. 1 shows. Two rolls, turned according to the shape to be given to the corrugations, act upon one another. The plain tubes are first made and then they are carried to the rolls, which are gradually brought closer to one another. In order to bring the tube into place the upper roll is lifted; it is then lowered and secured, and the train is worked in the ordinary manner. The lower roll is raised and pressed against the upper one by means of a system of levers moved directly by a steam piston. At the end of the operation it is found that the tube has not been lengthened, which proves that the metal had to stretch to form the corrugations. The inner and outer bends of the corrugations are found to be thickest, which is an advantage, because the decrease of thickness of the sides is useful for heating.

Corrugated boiler flues are by no means a novelty, as in this country flues very similar to those of Fox were used by James Montgomery, an engineer well known in connection with the Montgomery boiler. In England too, they seem to have found an early application, as a correspondent of the *Engineer* claims to have heard of some locomotives being made with corrugated fireboxes at the Vulcan Foundry, Warrington, about 1848 to 1850. Notwithstanding these previous applications great credit is due to Mr. Samuel Fox for having carried to a successful issue, by a close application to details, the development of an invention which may prove highly valuable.

The Anthracite Trade.

The Philadelphia *North American* says: Without expecting much in the way of immediate return upon the capital that may be invested in the exportation of Pennsylvania anthracite to foreign countries, we are yet glad of the venture and trust it may be greatly extended and generally imitated. The producing capacity of our mines at the present time is far in advance of any probable demand for home consumption, and it is only by means of a very large spirit of enterprise that the mining and transportation can be made permanently lucrative for all concerned. Of course the present home demand is not the gauge of the ordinary domestic trade in prosperous times, the contraction having affected this traffic as severely as the manufacturers have suffered. But even when the return of industrial enterprise and activity shall put an end to stagnation, the regular ordinary consumption, though increased beyond the current totals, will not approach the full capacity of the works.

The reliance for the ultimate demand must be upon the general use of coal in the locomotives upon the railways; upon the extension of the American iron manufacture and iron shipbuilding, iron bridge-building,

and the increasing use of iron in architecture; upon the return of railway prosperity and the consequent increased demand for railway iron, and upon the influence of our export trade in coal and manufactured goods. The growth of population in the New England and Middle States and the progress of civilization in this seaboard region, which is the chief consumer of anthracite, of course makes a regular increase in the demand upon the mines. And if population swelled in this section as it does in Illinois, Kansas, Texas and Iowa, the consumption of coal would keep pace with the producing capacity of the mines. But that is prevented by the pressure of taxation, the disparities of fortune and increasing impoverishment of the lower classes; and although

vigor, the result could not be doubtful. Chicago commands the whole Northwest, and could become as great a distributor of anthracite as Boston. As a rule small markets are governed by the great ones, and thus if we could make a first-class coal market at Chicago, all the lake cities would be influenced by the change. Of late years the attention of capitalists engaged in the trade has been directed to the universal distribution of our coal in all parts of the New England and Middle States by rail, sea and internal navigation, and the success has been remarkable. In many localities the growth of population and trade and industries has been mainly caused by the facilities for getting cheap fuel. And these enterprises have led to many railway extensions

and not exceeding \$1000, and all penalties recovered under this act shall be paid into the treasury of the State.

Section 3. All acts or parts of acts inconsistent with this act are hereby repealed.

Our Commerce with Germany.

Mr. Edward M. Smith, United States Consul at Mannheim, Germany, writing to the State Department under date of June 23d, says:

Knowing the desire of American manufacturers to extend their sales into Germany, and at the same time recognizing the difficulties that exist in introducing the newer ideas of our better skilled mechanics and more inventive manufacturers, I should

ful trade in Germany. Purchases are here made in very small quantities; generally only a sufficient amount is bought to fulfill the necessities of the day, and the shopkeeper seldom purchases beyond the wants of a single month. In every place of note some one can be found who will act as agent for any exporter who has an established reputation at home; thus, in connection with an intelligent salesman, trade can be established, the success of which must depend upon the superiority of the goods offered. For instance, the firm of Bendevilo, Mannheim, commenced in 1870 importing hams. Notwithstanding great obstacles in overcoming prejudices and stringent laws regarding trichena (a single ham infected with the disease condemning the whole importation), they have increased the amount of their importation largely, giving a single order for 10,000 hams, adding to it large importations of pressed beef, extending their sales into all parts of Germany. Recent importations of sausage thirty days from St. Louis are approved and found equal to the best made in Germany, opening a new and important trade. It can be sold with profit at a much lower price than it can be manufactured here, thus convincing the German that Germany is not the only land where the sausage, to him a desired article of food, can be produced.

The difficulty existing through the very stringent law regarding trichena is a serious obstacle in the importation of pork, in some places amounting to almost a prohibition. If certificate of freedom from trichena could be given by public chemists in the United States, based on the examination of the whole hog before it is cut up into marketable pieces, and these certificates accepted by the German authorities, much annoyance and useless expense would be avoided, and the exporter escape the risk of losing his whole exportation through the infection of only a small portion of it.

Fresh beef 21 days from St. Louis, sent in casks filled with a prepared fluid, retains its freshness and nutritive nature. While it is not equal in flavor to freshly killed beef, yet it will find a large market among the laboring classes, many of whom now, owing to its high price, do not taste meat more than once a week.

The introduction of stoves has been slow, yet now the familiar forms and familiar firm names greet the observing eyes of our countrymen.

Glass from Pittsburgh is making itself largely known on account of its strength and clearness. United States domestic cottons are carefully bought by the economical German housewife, and the "gude man" is not disappointed in their use.

Sole leather is largely imported and considered better than the English manufacture. Smaller American wares are exhibited in shop windows, gazed at and timely bought. The Americanische Nähmaschinen (sewing machines) and knitting machines are everywhere accepted with a change of name, and are almost believed by Germans to be of German invention. Canned vegetables, fruits, oysters, lobsters, &c., are sold in large quantities. With patience and an intelligent knowledge of German habits, almost everything that is considered desirable in the United States can be sold in Germany at a profit.

While labor is cheaper here than with us, and more hours are devoted to it, yet the American workman is more careful and more inventive than the German; even the Germans themselves when transported to our shores improve very much in their workmanship. Great care must be taken to send goods superior to German production, and not in too large quantities. The German is generally well informed as to the stock in market, and does not hesitate to take advantage of an overstock.

Transparency of Metals.—The discovery has been made that by means of electricity thin films, not only of gold, but of the other metals, can be obtained which transmit light very readily. The method of obtaining these tenuous sheets of metal is by causing electric sparks to pass from wires of the required metals, passing into tubes of rarefied air or other gases, when the particles of metal, detached from the wires by the sparks, become deposited on the sides of the glass, forming an excessively thin film, quite continuous under the microscope. Of the metallic films thus produced gold transmits a fine green light; silver gives a fine blue color; copper, a dull green; platinum, a bluish-gray; zinc, a deep bluish-gray; iron, a tint nearly neutral, but inclining to brownish, and cadmium, like zinc, a bluish-gray.

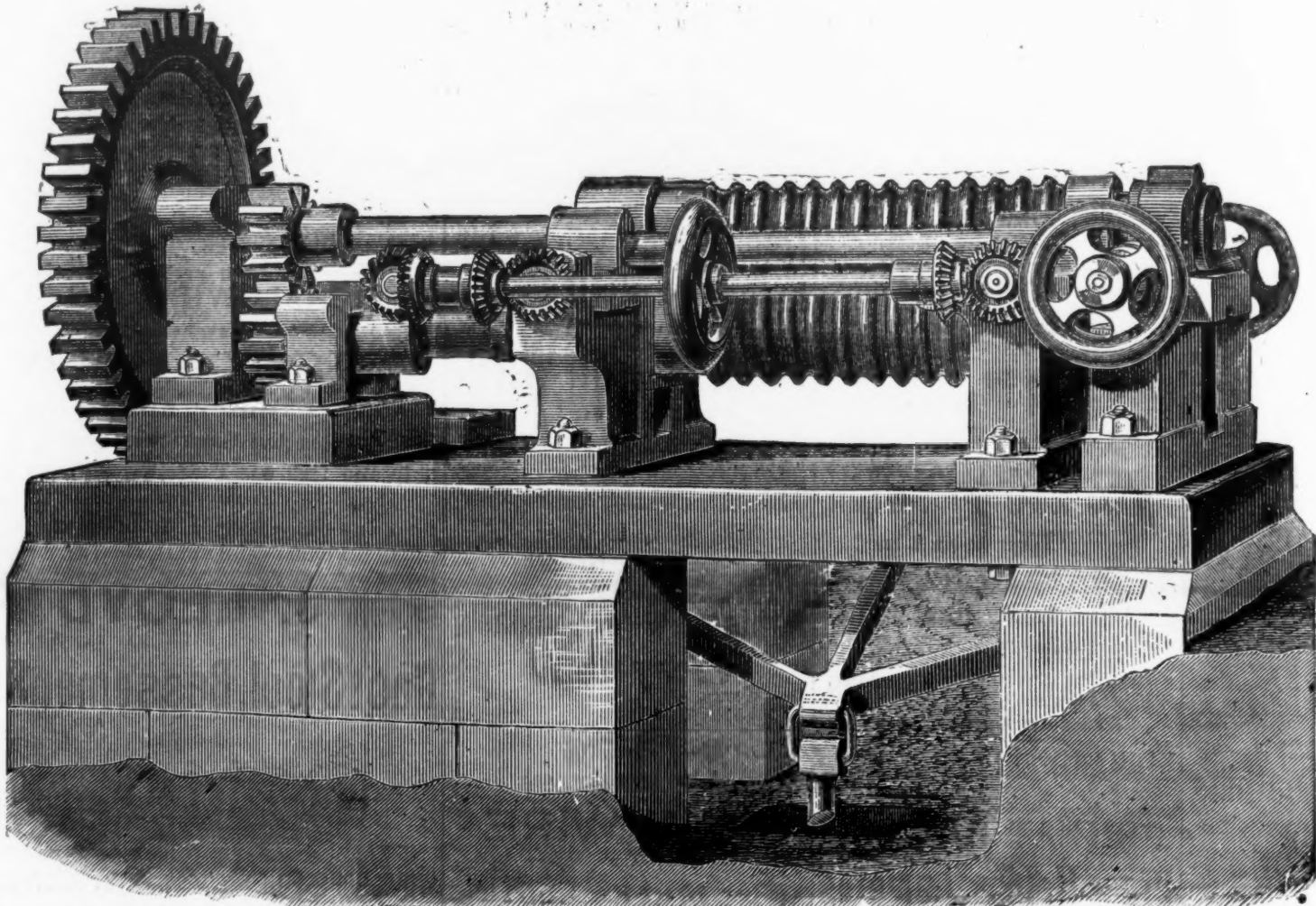


Fig. 1.—MACHINE FOR MAKING CORRUGATED BOILER TUBES.

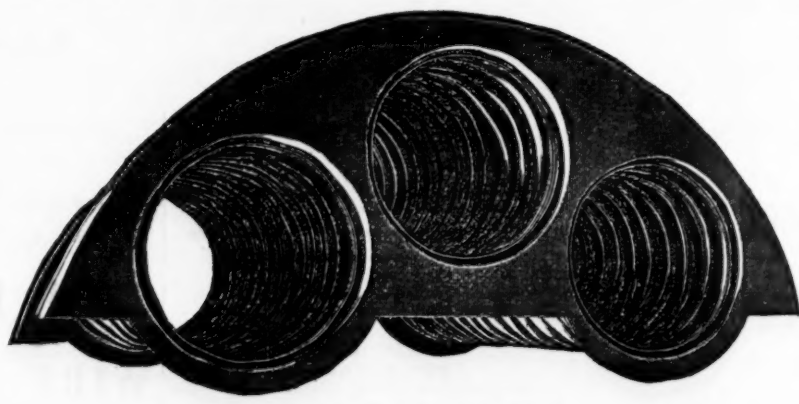


Fig. 2.—CORRUGATED BOILER TUBES.

What is a Ton or Bushel?—The recent Legislature of Pennsylvania passed the following bill in reference to what constitutes a bushel or a ton of bituminous coal. Herebefore a bushel of coal was 70 lbs.:

Section 1. Be it enacted, &c., That from and after the passage of this act the standing weight of bituminous coal in this Commonwealth shall be 76 lbs. to the bushel, and 2000 lbs. shall be a ton.

Section 2. If any person or persons engaged in the business of mining bituminous coal shall fix or establish any other number of pounds by agreement or contract to be a bushel of bituminous coal than is provided for in the first section of this act, such person or persons shall be guilty of misdemeanor, and upon conviction thereof shall be sentenced to pay a fine of not less than \$500

are inclined to think much of anything produced or anything said of us abroad, they look with suspicion and distrust on anything not national to themselves, and find faults that do not exist and endeavor to prevent importation. Notwithstanding these prejudices and hindrances, within the last five years the persistent efforts of Americans have compelled the people of Germany to accept and use many articles manufactured and produced in the United States. Judging from the experience of those who have been successful in American exportation, I am inclined to think that either an established depot from which experienced salesmen who know the habits of the German people could be sent out to establish trade, or salesmen sent by the manufacturer or the producer, are needed to make success-

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SEE PAGE 9.**Phelps, Dodge & Co.,**

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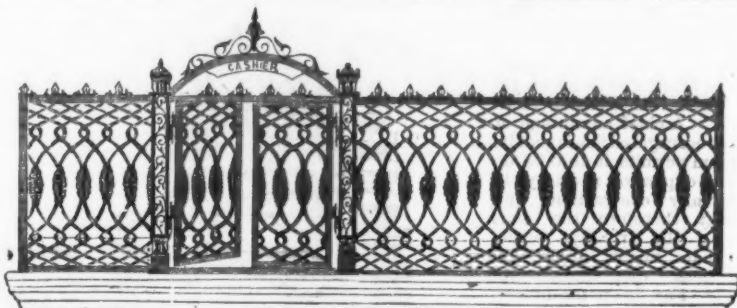
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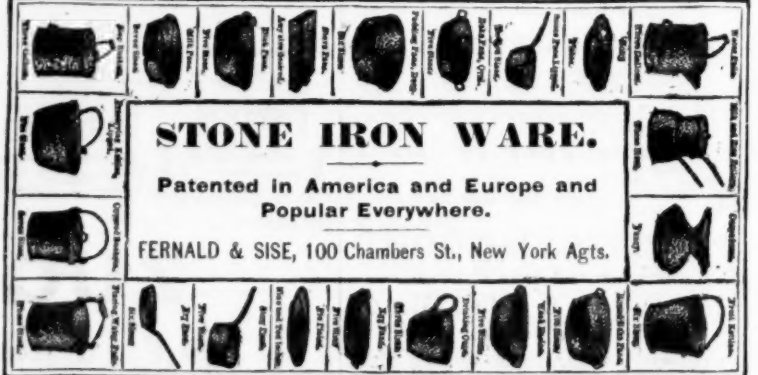
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The Electric Lighting of Paris.

A correspondent, writing from Paris under date of June 18th, says:
The stranger in Paris naturally desires to see the Opera House, and if he visits the grand square in front of the building he may observe in the roadway groups of gas lamps. At the top of each group is one lamp larger than the others, and apparently made of porcelain or the opaque white glass used for lamp shades. More careful inspection shows a number of large wires twisted neatly around the lamp post, all inclosing this strange white lantern. Before the Opera House are six of these lamps, and from one of the balconies extend heavy telegraph cables to each of the lamp posts. Further down the avenue are tall posts scattered about 130 feet apart along the way among the gas lamps. Let the visitor wait until about 8 o'clock, and suddenly, without warning, these tall, white lamps glow with strange fires. The dusky street flashes into sudden glare, white, intense and beautiful. The gas lamps in the shops burn in sickly yellow. Every sign on passing omnibus, or on the buildings, every detail in the architecture of the houses, every feature of the place, stands out in startling colors. The flowers are real and the trees of lively green; every dress and hat stands out clear and sharp in its true colors, as by daylight. The painted beauty of the boulevards dare not leave the gloom of the pale yellow gas. The electric light is as cruel as the sun, and her shame would be livid in the brightness. Fresh English girls, with roses and cherries won in healthful walks, stand in glad surprise under the strange white lamps, for it is sunlight, and their charms can survive the actinic test with honor. People sit in the restaurants and read their papers. It is like daylight, and it is not necessary to go to the lamp to see the print.

Should the visitor walk on toward the Hotel de Louvre, he would see one of the squares inclosed, in the Paris fashion, in the interior of a large building, brilliantly lighted by electric candles within porcelain globes. At the Orangerie, facing the Place de la Concorde, nearly fifty electric lanterns shine among the trees, and light up the concert hall and restaurant. Standing in the place the lamps shine like great moons, round and clear white. The concert garden sign is visible precisely as by daylight, and all the trees stand out clear and green against the darkness. The trees to the left, beyond the gate, make simply black masses, and the gas lamps among them look like small yellow stars. Within the garden the effect is most singular. The trees and flowers are plainly visible in every detail of leaf, petal and twig. The very stones of the gravel walk, the mosses on the walls, every stain and mark on the statues are visible as by day. Within the concert hall the effect is quite peculiar. The room is about 100 by 50, and quite lofty, and yet four candles placed on posts about ten feet high are sufficient to make the room lighter than it is by day. That is, there is more light than comes in by the windows in the daytime. Six lights are used, two extra lamps being placed in the orchestra; but in the adjoining hall, a room of the same size, four are sufficient for all practical purposes. The orchestra fills the stage, and a large audience occupies the floor. People are reading the finely printed programmes with ease, even at a distance of 50 feet from a lamp, and the band read their music with security. The wide doors are open, and more electric candles under the trees, where a large portion of the audience is seated at the little coffee tables, make it almost equally light there. Here, again, the actinic effect of the light is remarkable. The ladies' dresses appear in their real colors, the blues and greens holding their true shades as by day. There are no gas lamps, and the only light is from the white globes that shine so silently. It is not at all unpleasant to watch the lights, for, though bright, they are not painfully intense. They burn with remarkable steadiness, the only changes being an occasional lessening of the brilliancy and a strange alteration in the color, the globes sometimes assuming pale shades of blue and red. This may be in part an optical illusion, resulting from fatigue in the eye, but it is certain that unless the lamp is steadily watched, there seems to be absolutely no change in the quantity or color of the light in the room. Once, while looking at the lights, four of them went out, leaving only two in the room. This was still sufficient to enable any one to read in any part of the hall, but a workman at once came in, and, opening a wooden box at the base of each lamp post, corrected the difficulty, and the lights sprang up again in mysterious silence.

On following the wires, hung from lamp to lamp among the trees in the garden, we can trace the light to its source—three steam engines behind the building. These are small portable engines, each turning one or more electrical machines by means of belts. The machines are turning silently and swiftly, but there is neither light nor heat. The light only appears at the breaks in the circuits where the candles are placed. This is the sum of the matter: Steam power turned into electricity, or, in other words, drawing electricity from the exhaustless supplies stored in the planet itself. This is the light of the future, the solution of the great question of lighting cities—the transformation of power into light. Go out into the Place de la Concorde and look up the grand avenue to the Arc de Triomphe. The grand arch is as plainly visible as by day. The gas lamps shine like stars along the way, but the electric lamps before the arch outshine them all and make it plainly visible, though it is more than a mile away.

To enumerate all the places where the electric light is regularly used would be tiresome. More than 40 shops, warehouses, yards and railway stations are now lighted by the electric candles, and within a few months it is intended to light all the main boulevards and streets in the same manner. The electric lamps are lighted at dark and extinguished at midnight, the gas being then lighted to take their place. The traffic is over, and the gas is sufficient for the watchmen and late revelers.

Regarding the cost of electric lighting the various makers here seem to differ greatly, but it may be safely stated at about one-seventh of the cost of gas per candle power per hour. This much is certain: It is being rapidly introduced into the streets of Paris, and for a part of the night at least it will replace gas.

In regard to the use of electric light in dwellings and small halls this much may be said: The electric candle, as now made, is too powerful, except for grand halls, railway stations and wide streets. That it will be modified, or that a low-power lamp will be invented is reasonably certain, for the best inventors of two continents are at work on the problem.

Freight and Passenger Engine Bells and Whistles.—A number of locomotive bells of various shapes and composition have recently been cast at the Altoona shops, from which a selection will soon be made for the purpose of finally establishing a marked distinction between the sounds produced respectively by the bells of freight and passenger engines. A corresponding distinction will also probably be made in the sounds produced by locomotive whistles. The success of this undertaking will manifestly render good service by enabling railway employees and the general public to distinguish the character of an approaching train while it is still at a considerable distance, and valuable inferences may often be drawn from this information. The period is probably near at hand when a bell of long, clear and pleasing reverberation, or other marked characteristics, will apprise all whom it may concern that a passenger train is approaching or passing, while a heavier, duller, and more business-like sound will give notice of the movement of a freight train. In the bells already cast marked variations of sound have been produced by slight changes in the composition, shape or distribution of metal. One bell, containing five parts of copper to one of tin, is in the key of A, and another bell of the same composition, but with slight variations in the shape or distribution of metal, is in the key of B flat. Various other compositions and modifications have been tried which have produced such good results that between the sounds of several of the classes there is a contrast that any ear of average power could readily distinguish.

Demolition of a Factory Chimney with Dynamite.—An account is given in the *Deutsche Bauzeitung* of a recent interesting operation in Berlin, viz., the demolition of a workshop chimney by means of dynamite. This chimney was 170 feet high and contained about 10,000 cubic feet of masonry, weighing 864 tons. It had a division in the center. It was necessary to make it fall toward the east, and the charge was required to be as small as possible that the materials might not be much damaged by projection. Eight blasting holes were made from the exterior near the base, on two opposite sides, and their charge was placed as near the middle of the thickness as possible. The two chambers nearest the clearing hole on the east side were each charged with 6.15 lbs. of gun-cotton; those next the clearing hole on the west side received only 1 lb. of dynamite; the four other chambers were charged with 2.2 lbs. of dynamite. The tamping was effected by bricks and mortar. The total charge of 33 lbs. was exploded by electricity, all the parts simultaneously. The dull explosion shook the ground only to 950 feet distance; the chimney did not fall, but took an evident inclination, while three great cracks rose to 50 feet in height, and the lower part of the wall was laid open. The other holes were now made in the part of the wall remaining vertical, and a charge of 1 lb. of gun-cotton was inserted and exploded; the chimney then fell slightly toward the east.

Corrosion of Cast and Wrought Iron Water Pipe.—The *Hessen Geveerbblatt* remarks that it is well known that iron rich in carbon is less subject to oxidation than iron poor in carbon. Wrought iron, therefore, exposed to influences which promote oxidation, rusts more rapidly than cast iron. The very simple experiment of laying samples of both sorts in damp earth and leaving them there for a sufficient time will show the difference in their rates of rusting. The duration of wrought pipe when laid is thus likely to be less than that of cast pipe, and this is proved to be the fact in practice. Commonly speaking, the temperatures of water running through pipes in use is lower than that of surrounding bodies, and the walls of the tube are constantly condensing moisture, which powerfully promotes rusting. In houses, or in masonry conduits, where the pipes can be got at and kept protected, by tarring, painting or otherwise, from rust, wrought-iron tubing can be used with advantage; but in earth it is otherwise. An experienced engineer, who has often had to lay wrought-iron pipe in short lengths below ground, has always found them before long more or less destroyed.

There is perhaps no better illustration of the peculiar excellence of American workmanship than is furnished by the American horse car, nor any better proof of the good policy of superior workmanship than the favor with which these cars are received the world over. American cars are dearer than those made in Europe, yet ours are everywhere preferred, because of their superior lightness, strength and durability. Wherever tramways exist there they may be found, testifying to the quality of the work of our well-paid artisans. The proprietor of a shop which has sent cars to Europe, Asia, South America, and the isles of the sea, says that when the first dozen of American cars were placed on the road of the Bombay Tramway Company, the same number of English cars were introduced. Six months sufficed to prove the dearer American cars to be the most economical, and since then American cars have been used exclusively. The English car is one-fourth heavier than the American, giving so much more useless dead weight to carry, and ultimately gives way at the joints.

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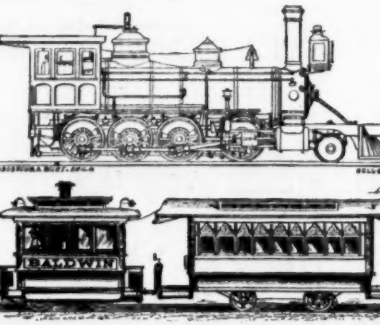

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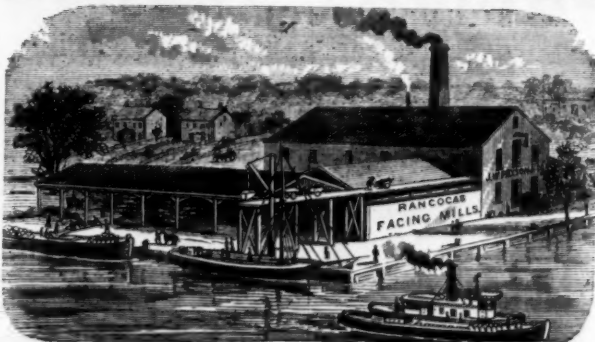
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SAN FRANCISCO, CAL., Cor California and Front Sts.

The Late Henry W. T. Bolekow, M. P.

Henry William Ferdinand Bolekow, senior
member of the well-known firm of Bolekow &
Vaughan, of Middlesbrough, died June 18,
at Ramsgate. The Iron and Coal Trades
Review prints a sketch of his life, from
which we quote as follows:Mr. Bolekow was not by birth an English-
man, but he was naturalized by special Act
of Parliament in 1868, and thus had all the
rights and privileges of British citizenship.
He was born at Sulten in Mecklenberg-
Schwerin, Germany, his father being a
country gentleman of some means. He re-
ceived a good education, and displaying a
decided aptitude for figures, &c., he was
placed in a merchant's office at Rostock,
where he gained his first insight into com-
mercial affairs. Rostock, it may be men-
tioned, is a shipping port in Mecklenberg,
the principal export being the grain grown
in the district. While there he came in
contact with Mr. Christian Allhusen, of
Newcastle-on-Tyne, and in 1827, leaving
Rostock, he came to England, and the two
commenced business as commission agents
and corn merchants at Newcastle, under
the style of C. Allhusen & Co. They
were very successful in their speculations;
indeed at the end of 12 years, when Mr.
Bolekow retired from the partnership, he
had amassed a fortune of nearly £50,000.
Before severing his connection with the firm
he had met Mr. John Vaughan, who was
then the manager of one blast furnace which
had been built at Walker by Messrs. Losh,
Wilson & Bell for smelting ores brought from
mines near Whitby. The representations of
Mr. Vaughan induced Mr. Bolekow to think
favorably of embarking his fortune in the
iron trade. Mr. Allhusen also gave up the
business of corn factor and went into the
chemical trade, founding the now well-known
firm of C. Allhusen & Co. At first Messrs.
Bolekow & Vaughan had no thought of uti-
lizing the Cleveland ironstone. In this new
venture Mr. Bolekow furnished the capital
and Mr. Vaughan the practical experience,
and subsequent events proved how well
the combination worked. Mr. Bolekow, in
1839, went to Stockton to endeavor to secure
land for the iron works they proposed to
erect, but his efforts were unsuccessful, and
his steps were directed to Middlesbrough,
then in its infancy. Here, in 1840, a site of
six acres having been bought close to the
river side—the same that the present Mid-
dlesbrough establishment occupies—mills and
forges and a foundry were erected. The
establishment, however, was small, and the
firm did not attempt to go in for smelting
pig iron, for what they used for the manu-
facture of their finished iron came from Scot-
land. How strangely are things reversed.
Now instead of receiving Scotch pigs into
Middlesbrough, Cleveland pigs are being
sent into Scotland at the rate of about 6000
or 7000 tons per week. Middlesbrough at
this time had a population of about 5000 in-
habitants, and at present it has ten times
that number. But Mr. Vaughan and his
partner were too astute to overlook the ben-
efits that would accrue if they smelted their
own pig iron instead of bringing it all the
way from Scotland and elsewhere, and they
accordingly, in 1846, decided to erect furnaces
at Witton Park, this site being selected be-
cause it was near the coal field, and because
the ironstone which it was proposed to use
was found in the coal measures. No one
dreamed of the immense stores embedded in
the Cleveland Hills, and not a single furnace
was erected in North Yorkshire or South
Durham. At Tow Law and Consett there
were furnaces. The firm had been very
successful as finished iron manufacturers
during the last five years, and in 1846 suc-
ceeded in turning out about 20,000 tons of
bars, rails, &c. They made the engines of
the first steamer built on the banks of the
Tees. The supply of stone for the Witton
Works was not equal to the demand, and the
firm had to resort to the Whitby stone.The years 1847-48 were marked by much
depression, something like the times through
which we have lately been passing, and the
firm of Bolekow & Vaughan did not escape;
indeed it is said that if it had not been for
the ready assistance of Messrs. Pease the
partnership would have been constrained to
succumb to its difficulties. In 1847 their out-
put of iron was but 4500 tons, and their
wages' bill only reached for the year about
£20,000. In 1848 trade revived, and the
business of the firm once more began to
prosper. In their furnaces they commenced
to employ the ironstone found scattered
along the sea shore, between Redcar and
Skinningrove, and in the year following
they bought the Skinningrove mines, which
they worked for a year, and then trans-
ferred them to Messrs. Losh, Wilson & Bell.
The story of the discovery of the main
seam of Cleveland ironstone has often been
told, and there are various versions of it.
That generally accepted is that in 1850 Mr.
John Vaughan and Mr. Marley, the engineer
to the firm, were walking one day on the
Normanby hills, when they picked up sev-
eral pieces of ironstone. Continuing their
search they entered the grounds of Sir John
Lowther, Bart., and there discovered a solid
rock of ironstone, lying bare, 16 feet thick.
Messrs. Bolekow & Vaughan at once entered
into arrangements for working the mine,
and in 12 weeks afterward not only had they
delivered seven tons at their Witton Park
Works, but before the lapse of six months
4000 tons had been sent out by them.
Various vague speculations had been in-
dulged in as to the probability of the Cleve-
land Hills containing iron ore, and it was
believed that the Anglo-Saxons had been
ironmasters on the Yorkshire range. More
than this, long before the days of Bolekow
& Vaughan ironstone had actually been found
at Normanby and sent to Tyneside to be
tested; but although various parties had
explored the hills and claimed the merit of
discovering ironstone, no person made any
practical use of their "find," and possibly
the Golconda of the North might have re-
mained its treasure for years to come had it
not been for the enterprise of the Mid-
dlesbrough firm. Messrs. Bolekow & Vaughan
were not long in leasing a large tract of
land, near Eston, and there established
their Eston mines. They made a railway
from the mines to join the Stockton and
Darlington Railway, and in 1851 built fur-
naces at Middlesbrough. Then it was thatthe town commenced to make the rapid pro-
gress it has done—a progress unexampled in
Europe, except by Barrow-in-Furness. In
addition to the furnaces at Witton Park and
Middlesbrough, it was soon found expedient
to build some at Eston. The business of the
firm went on and prospered, and the part-
ners reaped large fortunes out of their un-
dertakings. They built up a gigantic con-
cern, laying down new railways, opening
out new ironstone mines, sinking new col-
lieries—indeed, their prosperity was almost
unprecedented. During the Crimean war
they converted Cleveland iron into cannon
balls.In 1865 Messrs. Bolekow & Vaughan, both
desiring to retire from the active manage-
ment of a concern of such dimensions as
they had created, resolved to convert it into
a limited liability company, with a nominal
capital of £2,500,000, a million of which was
to be paid for the properties and stocks. In
1868 Mr. Vaughan died, leaving his son a
fortune of half a million, settling £3000 per
annum on his widow, and distributing
£130,000 among other relatives. As Mr.
Bolekow's share in the profits of the concern
would not be less than this, we can see how
the capital of £50,000 with which the part-
ners had commenced business had "in-
creased and multiplied." Mr. Bolekow,
after the limited liability company had been
formed, became the chairman of directors,
which position he occupied until his death.
Under judicious management the company
has attained great results. The nominal
capital has been increased by £900,000, and
very large dividends have been paid, the
shares being at a high premium in the mar-
ket. In 1865, the firm employed no fewer
than 8000 men, they raised annually about
750,000 tons of ore, and made nearly 300,000
tons of pig and manufactured iron. The
present company, in the late prosperous
times, employed upward of 12,000 men,
consumed annually 750,000 tons of iron-
stone, nearly 500,000 tons of coke, 200,000
tons of limestone, and 400,000 tons of coal.
Upward of 300,000 tons of pig iron are
produced annually, 100,000 tons of which
they work up into finished iron. The com-
pany own 14 collieries, from which they
raise about 2,000,000 tons of coal per an-
num; they farm 4000 acres of land, they
own hematite mines in Spain and elsewhere,
and keep a fleet of steamers conveying the
ore between their foreign mines and Mid-
dlesbrough. Altogether their works will
give employment to upward of 15,000 men.
The make of Cleveland iron exceeds 2,000,-
000 tons annually, or more than a third part
of the whole make of England, and fully
double the annual production of Scotland.
The total quantity of pig iron made in Eng-
land and Wales in 1870 was 17,350 tons less
than the yearly production of a single large-
sized Cleveland blast furnace at the present
day. The discovery of salt at Middles-
brough was due to Messrs. Bolekow &
Vaughan. It was made in boring for water
during 1863 and 1864. At present the works
are in abeyance. The great depth at which
the salt is found, and the immense pressure
of water, makes the sinking a work of con-
siderable difficulty. The company are show-
ing great enterprise; they have already
erected Bessemer steel works at Eston
which turn out 1200 tons of rails per week
and give employment to about 2000 men,
and are now converting their old finished
iron establishment at Middlesbrough into a
steel manufactory. The effect of these ad-
ditions must be shown in improved divi-
dends, for it is in the steel trade that the
greatest business is likely to be done in the
future.

The Communists and Machinery.

The San Francisco Commercial Herald
has the following:"Machinery must go" has now become
the slogan of the lazy, shiftless, vagabond
hordes at the East. It was first uttered in
England long years ago, was re-echoed in
nearly all countries of Europe, and has
finally crossed the Atlantic to be the curse
and bane of the United States. Late tele-
grams affirm that in Ohio the farmers are
receiving daily notices from the "Work-
men's Bread or Blood Committee," warning
them against buying labor-saving machin-
ery, and especially the self-binding reapers,
under penalty of having them and their
crops destroyed by fire if any attempt be
made to use such machines. The Work-
men's Bread, Blather and Blood Association
of California have not yet arrived at that
extreme point, although we have had rum-
blings already, but have confined them-
selves to the refrain the "Chinese must
go." The Mongol is the labor-saving ma-
chine which is their bete noir, and after he
disappears from the field as relentless and
unreasonable a war will be waged against
those grand inventions that American
genius has created and that have proved of
inestimable benefit to all classes. By their
aid every product of the soil has been cheap-
ened so as to place it within reach of the
poorest. Through labor-saving machinery the
"bread or blood brigade" has been pam-
pered on the finest wheat bread for a
trifle compared with the money paid for the
hard, black and indigestible bread which
they were glad to get in times past. But
argument, reason and the lessons of ex-
perience are alike thrown away upon people
who are little better than "cumberers of
the ground," who trample with swinish
ignorance upon the pearls of wisdom and
science. Poor by reason of their own pro-
clivities to vice and idleness, their own sot-
tishness and lack of energy in a country
teeming with natural resources of every
kind, they accuse the Almighty for not
making them rich. They are of the same
stripe with the notorious grumbler who in-
variably found fault with whatever he en-
countered. By some chance he went to
Heaven after death, and was there met by
the spirit of an old friend who had known
him well, and congratulated him upon being
safely landed in Zion. "Are you not now
satisfied?" he inquired. "Well, tolerably,"
was the response, "but you see, my wings
got badly soaked coming through the clouds,
and my halo don't fit me. We offer our
sincere sympathies to the bread, blood
and blather brigade" whose wings are prob-
ably soaked with alcohol, whose halos
hang upon them like "poor men's shirts on
hand-spikes."

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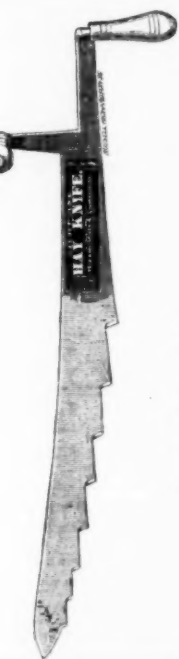
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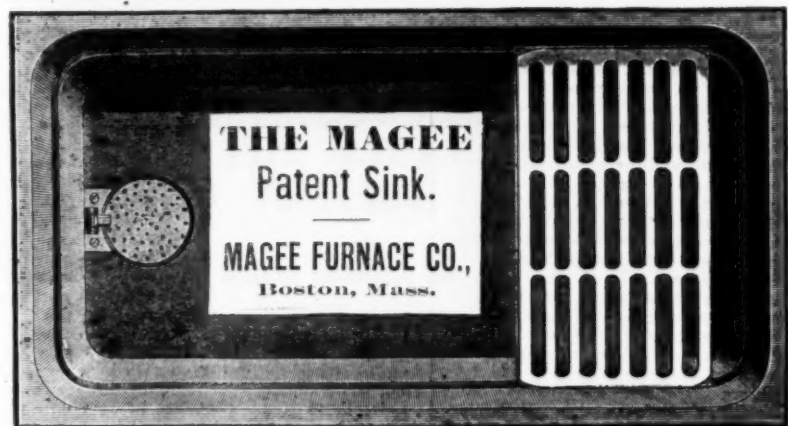


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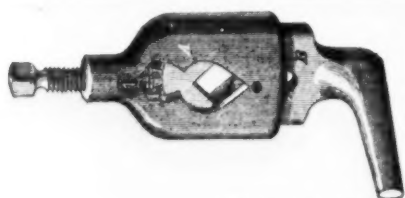
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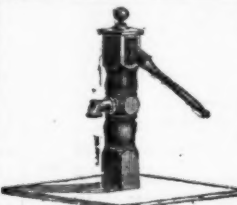
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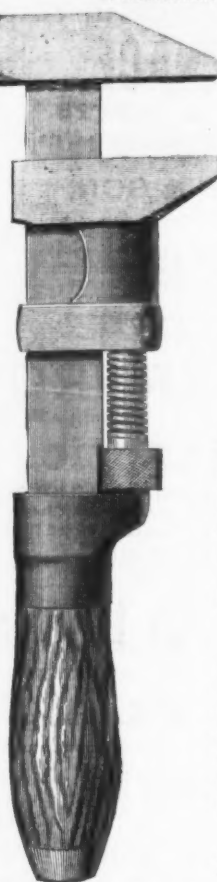
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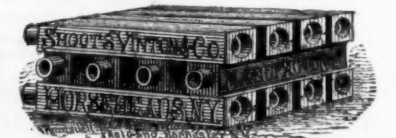
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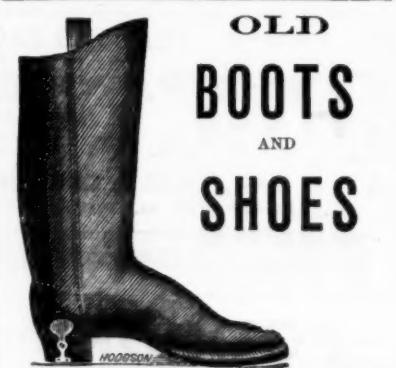
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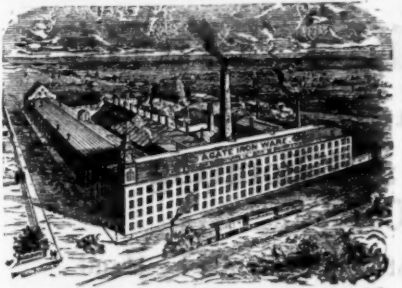
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broad, solid bearings in the knuckle,
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let the door sag. It is Fast Joint,
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Iron and Steel Matters in Albany and Troy.

The Troy Times says: Extensive improve-
ments are in progress at the Bessemer steel
works and the Rensselaer iron works of
Corning & Co., and it is estimated that be-
tween \$25,000 and \$30,000 will be spent in
replacing worn-out machinery and increas-
ing the capacity of the works before the
repairs are completed. At the steel works
new vessels on an improved pattern, and
capable of turning out a much greater
amount of steel than the old ones, are being
placed in the converting department. The
old ones have now been in use since the de-
structive fire at the works in 1868, and dur-
ing the intervening period several important
changes have been made in the construction
of this class of steel manufacturing ma-
chinery. The ovens are also in progress of
construction, and the spiegel furnaces and
large stack are being rebuilt. The latter,
when completed, will be 45 feet high. The rolls
in the rolling mill have been taken out and
will be returned before they are set up again.
The steam hammer, with a striking force of
eight tons, is to be repaired and improved,
and the foundation of the anvil, a solid piece
of iron weighing over 40 tons, is to be re-
constructed. The building and the mill are
paired where necessary, and nearly the en-
tire force employed at the works when run-
ning is engaged night and day making the
repairs and alterations named, so that the
temporary cessation of work does not force
many of the regular employees into idleness.
Several changes are also to be made at the
Rensselaer works. The location of the rolls
for the manufacture of steel rails is to be
changed, and new machinery for straighten-
ing rails will be erected. The remarks in
relation to the employees of the steel works
are also applicable to those of the Rensselaer
works, very few of the men being idle. It is
expected that the repairs at both works will
be completed in about three weeks, when
operations at these mills will be resumed.
There are orders now on hand sufficient to
keep the works running several months, and
the prospect for steady work all the ensuing
fall and winter is said to be excellent. The
Star Forge of the Messrs. Corning & Co. is
running this week, but it is expected that
some repairs will be made there as well as in
the steam mill. In the water mill some of
the old furnaces, which have been in use a
long time, are being torn down, and will be
speedily replaced by new ones. One horse
shoe machine of the Walker patent is run-
ning in this mill successfully. It is capable
of turning out about 30 shoes per minute,
fully 1800 an hour. They are pro-
nounced equal to any machine-made shoes in
the country, and are meeting with a very
ready sale. A train of rolls has also been
constructed in the mill in question for roll-
ing steel wire, and the manufacture of that
article has become quite an important item.
Iron wire is also made, but the rolls are
principally kept running on steel wire or-
ders, which of late have been large and
numerous. The project of converting a por-
tion of the Star Forge Mill into a horse-shoe
mill has been for the present abandoned, as
has also the plan for the erection of a new
building for horse-shoe manufacture. The
fact that such extensive improvements are
being made this summer at the works of
Corning & Co. is an evidence of increasing
prosperity and progress. It means that to
some extent at least the iron and steel trade
is improving, and that enforced idleness
will no longer be the rule at the iron works.
The works of the Messrs. Burden will proba-
bly be shut down for a short time next week
on account of Independence Day, but they
have been constantly running since last win-
ter, and the men, having lost little or no
time this year, can at least afford to celebrate
the Fourth.

A correspondent of the Rochester Express,
writing from Albany, makes the following
mention of the iron interests of Troy and
Albany:

Albany and Troy are what might be called
twin cities standing at the head of river
navigation. They are allied in many busi-
ness enterprises, but in none greater than
the manufacture of iron and steel. Many
years ago, when the manufacture of iron in
this country was in its infancy, large quan-
tities of English iron passed through the im-
porting house of Erastus Corning & Co.,
and found its way to consumers scattered all
over the State and portions of the West
reached by the Erie Canal and lake naviga-
tion. The common grades of English iron
were very inferior in quality, and for many
years our people were obliged to submit to
the imposition of the British exporter and
manufacturer, or pay a much greater price
for the product of our undeveloped resour-
ces. But this state of things could not
always exist, and now, in the matured state
of our iron manufactures, we can lay at the
Englishman's door a better quality than he
sent us and at a cheaper rate per ton.

There is no industry of the present age
that has overcome so many obstacles, or ar-
rived at such a stage of perfection as the
manufacture of steel and iron in this coun-
try. For this we are indebted to Erastus
Corning, John A. Griswold, J. F. Winslow,
Alexander L. Holley and others, many of
whom have "passed from earth away;"
but their works live after them, and they
have no more fitting monuments erected to
their memory than the furnace stacks which
rise thickly along the east bank of the river
between the two cities. These men became
acquainted with the iron deposits of Northern
New York, and assisted in starting the en-
terprises which have since developed them.

The first little charcoal furnace and forge
at the base of one of the Adirondack hills
proved the value of the ore, and now, from
a few tons of bar and pig iron, the Cham-
plain district produces over 400,000 tons of
pig iron per annum, and of a better quality
than the first product. The enormous pro-
duction is nearly all consumed by the steel
iron and stove works of Troy and Albany.

The first Bessemer steel plant in this coun-
try was built at the Rensselaer works in
Troy, then owned by John A. Griswold &
Co. The original patent for this process was
granted by the English government to Henry
Bessemer in 1855. John A. Griswold and
J. F. Winslow purchased the patent for this
country, and the first plant was a converter,
with a capacity of 2½ tons. This was
erected in 1865. The following year this

was increased by substituting two 5-ton con-
verters and a correspondingly large furnace.
At the time of the introduction of this pro-
cess here certain other parties of this coun-
try claimed a patent for the same process,
and after some litigation a compromise was
effected by the organization of the Pneumatic
Steel Company (Limited), in which was
vested the ownership of the patent for what
was called the Bessemer process, and seven-
tenths of the stock of the company was
granted to Messrs. Griswold & Winslow, as
they were the exclusive owners of the pa-
tents in this country secured to Bessemer.

This pneumatic company now embraces
11 different firms located here, in Pennsylv-
ania and the West, and the production of
steel has been one of immense importance.
The steel works at Troy have a capacity of
60,000 tons annually, 80 per cent. of which
is used for steel rails. The Albany and
Rensselaer Iron and Steel Company now
own and manage the steel works at Troy,
and since Jan. 3 last they have been running
without cessation. They know no night or
day there, and Sunday as a day of rest finds
no place in their calendar.

The London Times gives the following ac-
count of recent progress in artillery:

It will be remembered that 64 rounds
were fired at Spezia towards the end of the
year 1876 from the 100-ton gun supplied to
the Italian government, that the guarantee
of the makers was much exceeded, and that
the gun was then returned to them to be
chambered—that is, to be enlarged at that
part of the bore which contains the powder
charge, in order that a still higher power
might be developed. During March and
April of this year, experiments have been
made at Spezia to the extent of firing 35
rounds with the chambered gun. The object
of the trials was threefold—first to obtain
the ballistic data for the chambered gun
with English powder and compare them with
the same data for the unchambered gun;
secondly, to try the Italian Fossano powder,
which was described in the Times of the 5th
of January, 1877, and compare its action
with that of the English powder, as used
for the heaviest ordnance, and known as
P2; thirdly to determine the best form of
cartridge and means of igniting it.

The results with reference to the first
question may be summed up as follows:
Taking the proper charges for the uncham-
bered and chambered guns fired in each case
with a projectile weighing 2000 lbs., the
initial velocity of the former was 1424 feet
per second, the energy of the shot 28,130
foot-tons, and the pressure inside the pow-
der chamber—that is, the power tending to
rupture the piece—was 18.3 tons per square
inch of surface. With the chambered gun
the initial velocity was 1585 feet, the shot's
energy 34,836 foot-tons, and the pressure on
the interior of the chamber fell to 17 tons
per square inch. Thus we see that the result
of chambering the gun was to add 161 feet
to the velocity of the shot and about 6700
tons to its energy, while reducing the pres-
sure on the interior of the gun by more than
a ton per square inch. This addition to the
striking power of the shot is almost exactly
equal to the whole energy of a shot from
the English 35-ton gun at 1200 yards with a
charge of 110 lbs. of powder. Again, the
highest charge fired from the unchambered
gun during the former experiments was 375
lbs. The highest from the chambered gun
with English powder was 463 lbs. The re-
sults in each case were:

	Velocity.	Energy.	Pressure.
	Feet.	Foot-tons.	Tons.
Unchambered gun	1,424	28,130	21.4
Chambered "	1,585	34,836	20.8

No armor, whether intended to guard ship
or fort, has ever been constructed capable
of resisting the shot delivered from the
chambered 100-ton gun with the charge
given above. The energy of the shot is
nearly 4½ times that of the 35-ton gun at its
muzzle.

We now come to the second question—
that of the English and Italian powders.
And here the result is again extraordinary.
There is no necessity to jump to a conclusion
as to the superiority of Italian powder for
guns of very great caliber. It may be
found hereafter to have defects not yet ob-
served, but until such defects are discovered
it may be well to study its advantages. All
other things being equal, the best powder
will be that which imparts the highest en-
ergy to the shot with the least strain on the
gun. Taking this maxim as our guide we
will compare certain rounds fired during the
experiments this year with different charges.
In each case the mean pressure per square
inch on the interior of the chamber is
given:

	Energy.	Mean Pres're.
	Foot-tons.	Tons.
P2 powder	26,078	17.1
Fossano powder	34,836	12.9
P2 powder	34,836	17.5
Fossano powder	34,836	14.2
P2 powder	36,710	20.8
Fossano powder	36,710	17.4

Taking the average of these rounds we
find that the Fossano powder gave about
1000 foot-tons more energy than the Eng-
lish, with a reduction of four tons in the
pressure on the interior of the gun. On the
other hand, it must be remarked that the
quantity of Fossano powder used was con-
siderably greater than that of the English
powder. The average charge of the Italian
powder for the three rounds quoted was
492.2 lbs.; that of the English powder only
433.4 lbs. But the amount of powder consumed
in each round matters little compared with
the extended life of the gun; nor is it this
particular size of piece only which is affected
by the less destructive powder. The fact
that high velocities can be obtained without
undue pressure on the interior of the gun
renders a further development in the size of
great ordnance not only possible but easy.
It seems certain that, if heavier projectiles
are required, there is no reason why shells
of two tons weight should not be fired with
a velocity compared with which that of the
wind in the wildest storm is but as the
breath of a sleeping infant, for the velocity
of the shot in the last round we have
quoted was 1661.5 ft. per second, or, in
round numbers, 1700 miles an hour, and its
weight not far short of one ton.



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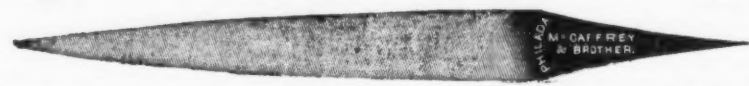
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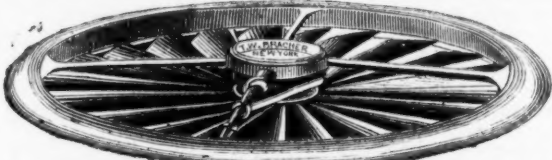
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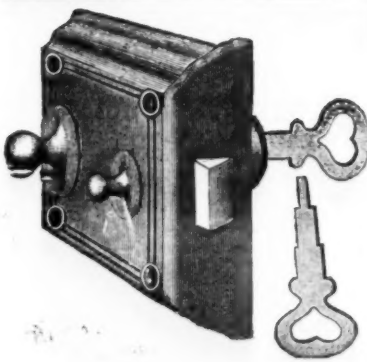
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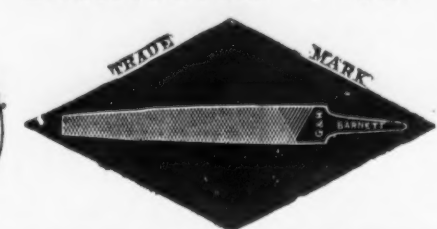
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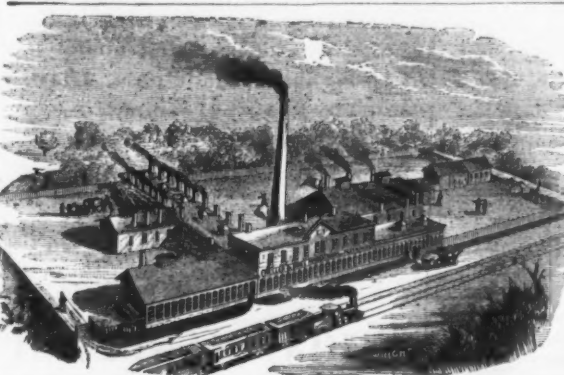
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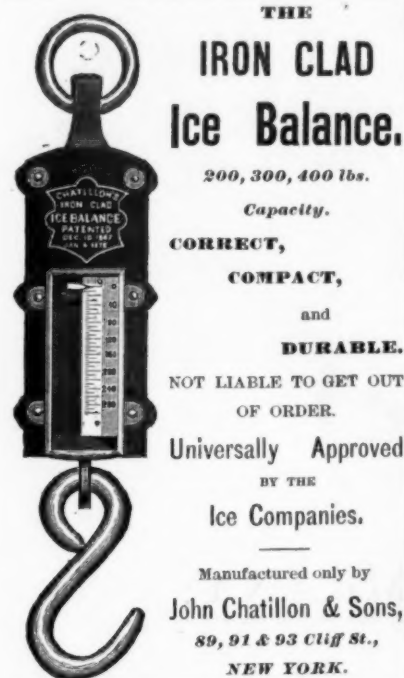
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son Canal Co.'s Building, Transatlantic Steamship
Co.'s new Dock, American News Office, &c., Posey
County Court House, Mt. Vernon, Holt County
Court, Oregon, Mo. Also to buildings in Boston,
Cincinnati, Detroit, Jacksonville, Wis., Baltimore,
Canada, &c. Have been for years in daily use in
every principal city throughout Europe, and are in-
dorsed by the Leading Architects of the
World.

Office and Manufactory,

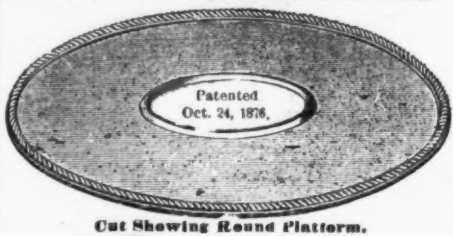
162 & 164 West 27th Street, N. Y.

ANSONIA CORRUGATED STOVE PLATFORM

Manufactured by the

Ansonia Brass & Copper Co.

Office, 19 & 21 Cliff Street,
NEW YORK.



Section Showing Edge.

ANSONIA Bronzed Fire Screen,

With Ornamented Mouldings.

PATENT APPLIED FOR.

The Portable Bronzed Fire Screen or
Shield, as shown in the illustration, is especially
designed for the safety and protection of walls,
furniture, woodwork, paper or varnish from heat.
Being constructed of metal, with firm and substan-
tial edges, curved in form to stand alone, it may be
easily adjusted in any position about a stove, before
a grate or fire place. The demand for something
useful, durable and ornamental as a Fire Screen has
long been felt, and having finally accomplished the
desired result, we are prepared to fill all orders
promptly.

The Ansonia Corrugated Stove Platform,
with its heavy figured edge border, is believed
to be the best Platform offered to the trade.
As shown in the illustrated section herewith it
requires no nailing to keep it in place or to
prevent it from turning up at the edge; while
the metal is of sufficient thickness to require
no lining.

The low price, superior quality and fine
finish of this Platform will be readily acknowl-
edged. Packed 34 in a case.
Send for price list.



CHAINS UNION CHAIN WORKS, REITER & MORTON, Pittsburgh, Pa.

Manufacture all kinds of

Coil, Cable, Crane, Railroad, Wagon and Agricultural Chains,
From Best Standard Brands of Iron.

Our Chains are all thoroughly tested and warranted, and will be found equal to the
best of either home or foreign make.

Prices the very Lowest.

PHILIP S. BIGLIN,

Successor to W. F. SHATTUCK & CO.,

Manufacturers' Agent for

AMERICAN HARDWARE,

100 Chambers St., New York.

Shattuck's Union and Counter Scales.
Fleming's Axes, Hatchets, Picks, &c.
Wellman's Gimlet, Gimlet Bits, &c.
Griswold's Augers, Auger Bits, &c.
Holtzrad & Co.'s Saws and Dies.
Yaw's "Genuine" Wrought Cow Bells.
Horton's Hand and Sleigh Bells.

Maitly's Britannia and Cecon Dippers.
Eddy's Reduced Lamp Black.
"Eagle" Axe, Pick and other Handles.
"Eureka" Flint, Sand and Emery Papers.
Cortland Forged Horse Nails.
Tackle Blocks, Spokes, &c., &c.

DARLING, BROWN & SHARPE

Providence, Rhode Island,

MANUFACTURERS OF

United States Standard Rules,

AMES' UNIVERSAL SQUARES,

Patent Hardened Cast Steel Try Squares,

THE AMERICAN STANDARD WIRE GAUGE,

Bevel Protectors, Hardened T Squares and Bevels, Center Gauges,

Steel, German Silver & Boxwood Triangular Scales, Vernier

Calipers, Caliper Squares and Rules, Plumb Bobs,

Paper Drawing Scales, Willis' Odontographs, Steel Straight Edges,
and T Square Blades.

Medals Awarded: Paris Exposition, 1867; Vienna Exposition, 1873; Philadelphia, 1876.

Illustrated Catalogue sent per mail on application.

The Tornado at Pittsburgh.

The 4th of July at Pittsburgh was cele-
brated by the elements in a very unusual
and terrible way. The weather, as it had
been for days, was intensely warm, and
whoever could, cit or countryman, was out
in the groves or green fields, seeking shade
and coolness. Toward noon the thunder
growled for a few moments and there was a
scurry of rain; then the sky became as
clear and the air as warm and as still as be-
fore. Again toward 2 o'clock, or a trifle
after, the heavens were darkened; clouds
black as ink came up, through which long
swathes of purple and crimson were mown
by the distant lightning; the storm came
nearer, and at last broke over the city with
tropical violence. It was intensely dark
and vividly light at the same time, so murky
was the sky and so incessant the blinding
flashes of the lightning; the roar of the
thunder never left the ear, though every few
seconds it was varied by the sharp crack
and tumbling crash of a nearer stroke; the
rain came down in solid sheets of water, and
big hailstones pelted the roofs and pave-
ments with the patter and crackle of a
musket fire. The gutters were instan-
taneously turned into roaring brooks, and
streams turbid with sand, refuse and stones,
came pouring down each hill street to feed
miniature seas in the open spaces of low
ground beneath. Within two hours rain
fell to the depth of two and four-fifths
inches; at the Allegheny House, two hours
after the storm was over, hailstones could
be picked up by the double handful. Car-
son street was covered with mud, sand and
gravel washed from the hills to an average
depth of three feet. Within an area of two
squares in Allegheny the lightning struck
three times. On Murray avenue, Beltz-
hooverborough, the gutter current rose so
furiously that a boy losing his footing was
swept away by it and carried over a
block at imminent danger of drown-
ing ere he could be hauled out. At
1701 Carson street the flood made a great
pond of the excavations begun for the foun-
dation of a new house. During the night
that succeeded the waters ate away the ex-
posed walls of No. 1703, occupied by two
families. The hills and fields around, which
were dotted with pleasure seekers and picnic
parties, saw many singular spectacles. At
the Ramble, back of the inclined plane, a
gathering was suddenly broken up and the
men started to run hill to shelter. At
Moyes' Grove the dancers to the number of
some hundreds had to seek refuge in a barn;
ere they could reach it the water through
which they waded was knee deep. At Ross
Station two ladies were stunned or fright-
ened into senselessness by a terrible thunder
stroke, and their friends had to break down
the door of a neighboring house to find a
place to lodge and resuscitate them, its
inmates in panic having locked themselves
in and being unable apparently to move
to open the door. The railroad culvert
at Windwood was choked with timber
and debris; in five minutes the water
rose 15 feet, then swept off the station
house, which literally melted away on the
bosom of the flood like a snowfall on a hot
stove. At Sandy Creek Thomas Murphy
and his wife had to struggle with their three
children through a fast-rising stream from
the house to the barn; within this the water
rose so that they had to clamber to the loft,
break away boards from the roof and make
a bridge thence across the water to the high
bank.

Indeed, there were more serious accidents
than this on Sandy Creek, which is a in-
significant affluent of the Allegheny, a few
miles this side of Verona. In the twinkling
of an eye it became a raging torrent from
eight to ten feet deep. A little distance up
the stream lived Abner Conner, aged sixty,
his wife and their daughter. A miner named
Abner Long had sought shelter under their
roof from the storm. Just above the house,
at an elbow of the creek, a great quantity
of drift timber and the wreck of about half
a mile of railroad and forty cars that had
been swept away suddenly formed a dam.
For a few minutes the people in the house
must have missed the roar of the stream,
suddenly throttled; it rose high and spread
out widely behind the obstacle; then there
was a crash, like the discharge of a great
cannon; the timbers and wreck of the dam
were tossed about like chips, and with one
bound the mass of water mounted over the
banks of the creek and blotted out Conner's
house and the four living souls it contained.

But the most serious accident of all was at
the Sugar Camp, a grove of some fifty great
trees, opposite the Ross mansion. Here the
Sharpsburg German Lutheran church held
its picnic. The sports were rudely inter-
rupted by the storm, which unroofed the
temporary shelters provided in the grove
and compelled the picnickers to take re-
fuge in great covered wagons. Here as many
as could find room huddled together, the boys
and men covering beneath the vehicles,
while overhead the thunder pealed inces-
santly, and around there was an atmosphere
of lightning. One flash struck the Cosmos
refinery, in plain view on the opposite shore
of the river, and in the fascination of the
sight of the brightly burning oil in the tanks
the picnickers forgot their own peril. At
that very instant one gust of wind swept
up the valley and smote the grove, the
trees of which were from 3 to 5 feet in di-
ameter. Some, sighing deeply, almost lashed
the wet earth with their tops and sprang
back; others were peeled and twisted like
vithes, but one of the greatest, splintered at
the same instant by a stroke of lightning, fell
upon the wagons. There was a moment's
pause, then the others present rushed off
for axes and levers, and chopped, pried
and tore away the limbs to get at their
friends beneath the wreck. The blow fell
with such stunning force that a hollow from
eight to ten feet deep was smashed in the
ground, and the wheels of the wagon were
driven into the earth up to the axles. Two
other persons were killed here. At another
wagon a bough struck a young woman of 20,
on the back of her head, and smashing her
skull like an eggshell, killed her instantly.
A youth of 18 had his skull broken; his
brother, aged 9, was standing further out,
and at the crash started to run, but like a
giant's hand a down-rushing bough seized
him and dashed him into the ground—into

it, for the print of his body, three inches
deep, was visible. His head was flattened
and torn off and his brains scattered over
the ground around. Several other persons,
some 20 in all, were badly hurt; one had her
back broken, another was internally in-
jured, some suffered from fractured legs and
arms, one had two ribs smashed in. Still
others will undoubtedly die, and for years to
come many hearts will bleed at the remem-
brance of July 4, 1878, the day which begun
with exquisite beauty but closed in storm and
elemental wrath such as are rarely seen be-
yond the tropics.

Pneumatic System of Hoisting in Mines

The application of the pneumatic system
for hoisting in mines would seem bold at first
sight, and yet it is now a practical success,
and it promises to become, says the *Revue
Universelle*, the hoisting system of the fu-
ture for at least all raising from a great
depth. The idea of applying compressed or
rarefied air for hoisting the cars from a
mine in a closed tube by means of a piston
is old. In 1864 it was proposed by a Russian,
Professor Maurer, but the credit of having
first tried this method of extraction, and of
having assured its success by the care exer-
cised in all details of construction, is due to
the Epinac Mining Company and to its chief
engineer, M. Blanchet. For depths of 1200
to 1600 feet cables and hoisting machines
suffice for a large output, but as the mines
become deeper the difficulty increases; the
dimensions which must be given to the ma-
chines and the ropes become enormous, and
the number of trips made by every cage in
24 hours decreases rapidly. The velocity
which may be given to a piston in a tube is
by far greater than any speed which can
possibly be acquired by rope without peril.
The main point, however, is that in the
pneumatic system the dead weight remains
constant, whatever may be the depth
reached. If two connected tubes are used
instead of a single one, the dead weight is
entirely done away with, as the pistons and
cages balance one another, supported as
they are by a column of air weighing almost
nothing, instead of being suspended from a
rope which is heavy and cumbersome, and
is exposed to a break at any moment.

The elasticity of atmospheric propulsion
seems a guarantee against any accidents.
The only fault of the Epinac plant is its de-
ficiency in motive power, as the machine
can only exhaust 36 cubic feet per minute.
A more powerful machine is now building,
which will do at least ten times as much, and
reduce to two minutes the time required for
the ascension of a car from a depth of 2000
feet. As it is working now the system has
furnished an output three times greater
than that which the same motor, working
with ropes in the ordinary manner, could
yield.

Hoisting by means of a pneumatic tube
calls for a plant composed of three principal
parts: the machine for exhausting the air
above the piston, the pipe passing through
the whole shaft, and the piston which car-
ries the cars.

At the Hottinguer shaft, near Epinac, the
tube is composed of 674 rings of sheet iron
and 18 special cast-iron rings, which are
designed to receive the accessory apparatus.
The diameter of the tube is 5 1/2 feet, one
ordinary ring weighing about 1100 pounds.
Each one is made of one sheet, the edges
being riveted together with the inside heads
countersunk. The horizontal joints are
made by means of angle iron 2 1/2 inches
wide and .56 inches thick, the inside rivets
of which are also countersunk. This angle
iron therefore forms flanges, which are con-
nected by 60 bolts. A rubber ring is placed
between two joints, thus making the tube
air-tight and permitting at the same time
some play for variations of temperature.
The door rings are .56 inches thick, and are
furnished at opposite sides with doors which
allow the cars to go in or out. They have a
vertical sliding motion. The valve rings
are very similar to the sliding sluice valves
of gas mains.

The tube is braced against the timber of
the shaft; it is furnished with various ac-
cessory attachments, brackets, cocks, valves,
working and equilibrium pipe, barometers
and safety valves. The safety-valve pipe
starts from the lower part of the tube and
leads to the open air, where a valve is at-
tached which may be closed at will. With
its aid the speed of the piston in rising or
descending may be regulated. The upper
piston carries the cage which holds the car,
there being nine at Epinac; below the cage
there is another piston which is called the
lower piston. The upper piston is double,
the two parts which compose it being so far
apart from one another that the distance
exceeds the height of the doors. The lower
piston has a valve which is opened when
the car carries passengers. At the charging
and discharging stations the full cars are
placed or taken off in three movements,
which are effected in the most simple man-
ner by opening or closing the admission or
escape valves of the air.

The pneumatic system has been working
at the Hottinguer pit for 18 months without
any injury to the tube or to the cages and
without any repairs. Besides a saving in
fuel, the system possesses the advantage of
leaving the shaft open for inspection, re-
pair, &c. The disadvantages connected
with ropes, the danger of their uses and the
expense of their frequent renewal disappear
entirely. The ventilation of the mine is
also increased, and the hoisting apparatus
may be made a valuable adjunct of the ven-
tilators when a strong barometric depression
makes the danger of fire-damp greater than
usual.

An Iron Company's Failure.—The
Pomeroy Iron Company, V. B. Horton,
president, of Pomeroy, Ohio, has made an
assignment. Liabilities estimated at \$70,-
000; assets, the rolling mill, real estate and
outstanding accounts.

The telegraphic announcement of the de-
struction by fire on the 6th inst. of the Seth
Thomas Clock Co.'s works at Hartford, was
contradicted in a later dispatch. It was
Seth Thomas's barn and some other build-
ings which were burned. The works were
not on fire at any time.

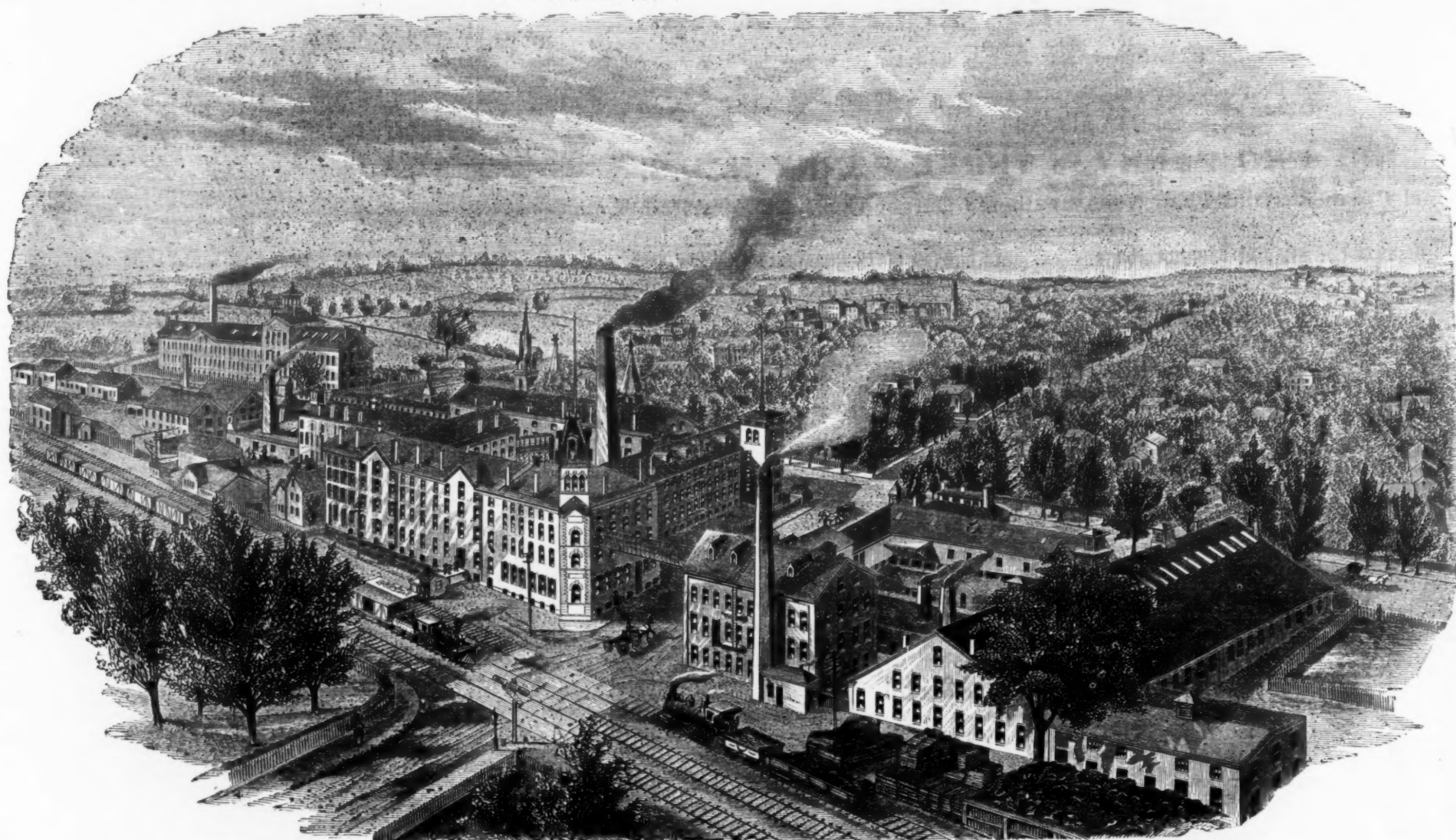
RUSSELL & ERWIN MANUFACTURING COMPANY

Manufacturers of HARDWARE.

FACTORIES, - - - NEW BRITAIN, CONNECTICUT, U. S. A.

MANUFACTURERS' AGENTS AND DEALERS IN GENERAL HARDWARE AT OUR

WAREHOUSES: NEW YORK, 45 & 47 Chambers Street; PHILADELPHIA, 425 Market Street; BALTIMORE, MD., WM. H. COLE, Agent, 17 South Charles Street.



Screw Factory.

Offices, Packing Room and Main Factory.

Finishing Shop.

Iron Foundry.

WORKS OF

THE RUSSELL & ERWIN MANUFACTURING COMPANY,
NEW BRITAIN, CONNECTICUT, U. S. A.

RIM AND MORTISE DOOR LOCKS, KNOBS, &c.

Particular attention is called to our new lines of Rim and Mortise Locks, with our

PATENT ALL STEEL NICKEL-PLATED KEYS.
WOOD SCREWS, - - - Complete Assortment.

POLISHED FIRE IRONS, Iron and Brass Head Shovels and Tongs.

HALE'S MEAT CUTTERS, Bake Pans, &c., &c.

PADLOCKS.

CABINET LOCKS.

Sole Agents for the

DOUGLASS MFG. CO., JAMES SWAN, Successor,
Best Cast Steel CHISELS, DRAWING KNIVES, AUGERS, BITS, Cook's Patent
AUGERS, BITS, &c., &c.

We also offer a full line of

GENERAL HARDWARE

at lowest market rates.

Cutlery.

FRIEDMANN & LAUTERJUNG,

Manufacturers of PEN AND POCKET CUTLERY.

Solid Steel Scissors, Shears, Razors,
Russia Leather Straps, Hones, &c.

"ELECTRIC RAZORS,"

And the celebrated "ELECTRIC SHEARS." Nickel Plated
Hones.

Agents for the BENGALL RAZORS.

AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.

91 Chambers and 73 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.

MERIDEN CUTLERY CO.

The Oldest Manufacturers of Table Cutlery in America.



EXCLUSIVE MARKS OF THE

CELLULOID

HANDLE FOR TABLE CUTLERY. A most beautiful and perfect substitute for Ivory. Also makers
of all kinds of TABLE, BUTCHER AND HUNTING KNIVES.
Illustrated catalogues with prices sent to the trade on application. 49 Chambers St., New York.

THE
LAMSON & GOODNOW
88
CHAMBERS ST.
MFG. CO.
N.Y.
GARDNER'S PATENT
AMERICAN TABLE
CUTLERY & C.

NAUGATUCK CUTLERY CO.,

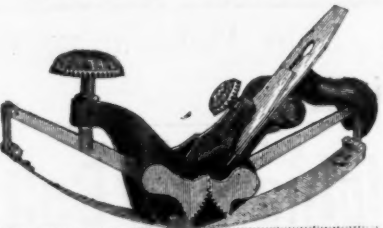
Manufacturers of FINE PEN & POCKET CUTLERY.

FULLER BROS., Sole Agents, 89 Chambers and 71 Reade Sts., N. Y.

STANLEY RULE AND LEVEL CO.,

MANUFACTURERS OF

Improved
Carpenters'
Tools.



FACTORIES,

New Britain, Conn.

WAREHOUSES,

29 Chambers St.,
New York.

HALL, ELTON & CO.,

Electro Plated Ware, German Silver and Britannia Spoons.



Factories, Wallingford, Conn.

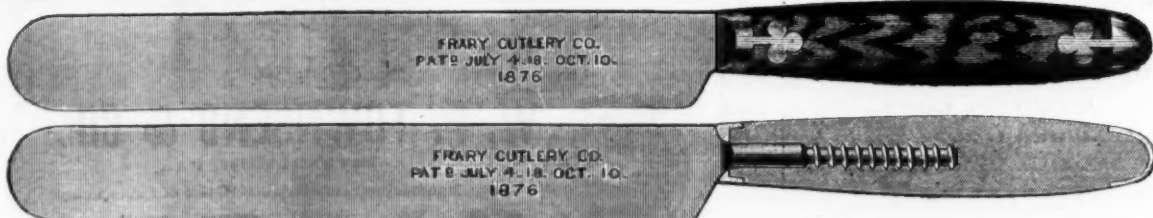
Salesroom, 75 Chambers Street, New York.

THE FRARY CUTLERY COMPANY,

FACTORY, BRIDGEPORT, CONN.

NEW YORK OFFICE & WAREHOUSE, with WIERUSCH & HILGER HARDWARE CO., 84 Chambers St.

Manufacturers of all kinds of Table Cutlery.



The above illustrations represent their New Patent Screw Tang Lock Fast Solid Handle Knife.

There is no question but that a solid handle knife is much more preferable than a scale tang. The great objection to their use hitherto is, that no solid wood handle has been placed on the market with the handle properly secured—no handle put on with cement will stand the wear and tear of every day usage. The cement will expand and contract with the action of heat and cold, and become loose, crack and come off, causing great prejudice against their use. This objection is overcome in our patent screw tang. A wood screw is welded to the tang of the knife or fork, and screwed firmly and securely in the handle and locked there by the bolster, making a very strong and handsome knife, which we warrant never to get loose, crack or come off. We manufacture a large variety of patterns, both Table, Butcher and Carvers, and furnish the patent handle nearly as low as the scale tang. We are prepared to furnish this line of goods, together with the scale tang and iron handle, very promptly, and very respectfully invite the attention of the trade.

CLOTHES WRINGER!



"EUREKA"
WRINGER.

T. J. ALEXANDER, Manager,
BOSTON, MASS.

Bemis & Call Hardware & Tool Co.



PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.

For Circulars and Price List, address

BEMIS & CALL HARDWARE & TOOL CO., Springfield Mass.

Cutlery.

McCOY & CO.,

SUCCESSORS TO

Van Wart & McCoy.

Importers & Commission

Merchants.

Hardware, Cutlery, Sad-

dlery, Metals, &c.

134 and 136 Duane St., New York.

Cutlery.

JOSEPH S. FISHER,

No. 411 Commerce St., PHILADELPHIA

AGENT FOR

George Wostenholm & Son,

"Limited."

Washington Works, SHEFFIELD,

Celebrated I-XL Cutlery, Razors, &c

AGENT FOR

WALTER SPENCER & CO.,

Steel and File Manufacturers,

Rotherham, ENGLAND.

Corporate Mark.



Granted 1777.

HERMANN BOKER & CO.,

101 & 103 Duane Street, New York,

SOLE AGENTS FOR THE

**GARDNER PATENT
POCKET KNIVES**



All of Gardner's Patent Knives are fully warranted.

ESTABLISHED 1853.



AARON BURKINSHAW,

Manufacturer of Pen and Pocket Cutlery, Pepperell, Mass.
My Blades are forged by hand from the best Cast Steel, and warrant-
ed. To me was awarded the Gold Medal of the Conn. State Agricultural Society.

RUSSELLS



PATENT

PARALLEL
TOOLS.

HAGSTOZ & THORPE.

Sole Manufacturers and Proprietors.

11th and Chestnut Sts., Philadelphia, Pa.

CORPORATE MARK,
* * *

Joseph Rodgers & Sons'

(LIMITED)

CELEBRATED CUTLERY,

No. 82 Chambers Street, New York.

F. & W. CLATWORTHY, Agents.

The demand for Joseph Rodgers & Sons' productions having considerably increased, they have, in order to meet it, greatly extended their Manufacturing Premises and Steam power.

To distinguish Articles of Joseph Rodgers & Sons' Manufacture, please to see that they bear their Corporate Mark.

ESTABLISHED 1853.

NEW YORK KNIFE CO.

MANUFACTURERS OF SUPERIOR

Table & Pocket Cutlery,

WARRANTED TO BE MADE OF THE BEST MATERIAL.

WALKILL RIVER WORKS,

Walden, Orange Co., New York.

THOS. J. BRADLEY, President.

ALFRED H. HILDICK,

13 Warren St., N. Y., Importer of
Birmingham Heavy Hardware, Chains,
Anvils, Vices, &c.

Agency of HILL BROS. & CO., WALSALL, ENGLAND
GENERAL HARDWARE MERCHANTS,
And of

Ball's Pat. Solid Steel Sheep Shears.



These Shears are unsurpassed for cheapness, durability and utility. They are made of one solid piece of steel from point to point, and cannot be broken in use, either in the bow or at the junction of blade and handle. Samples can be seen at above address, or sample lots furnished. Depot for "THE CROWN" SOLID BOX VICES. A cheap and excellent Vice.

L. SOLOMON,
Commission Merchant
in
House Furnishing Goods.

Agent for the
Champion & Knox No. 99 Fluting Machines,
EUREKA & PEERLESS WRINGERS,
100 Chambers St., New York.

Our Exports of Metal Cartridges.

The quantity of cartridges and of cartridge metal sent out to the Old World since the late war between Russia and Turkey became probable, is quite surprising. As many as 400,000,000 cartridges have been ordered under a single contract. If the question is asked, "Why this preference for metal from the United States," the answer may be found in its superior toughness and ductility, which permit it to be drawn out like wire or pressed into any shape required. With no less accuracy it may be affirmed that the secret lies in the special formula observed in the combination of copper with spelter, tin and other metals, and which was obtained only after costly and wearisome experiments. The three manufacturers engaged in this business are the Coe Brass Company of Wolcottville, Ct.; Brown Bros. of Waterbury, Ct.; and Wallace & Sons, each of whom have made great efforts to excel. That much of the success gained is due merely to manipulation of the alloys is proven by the fact that notwithstanding foreigners take our ores of copper and spelter and manipulate them in their own way, the result in comparison is failure. The Russians and Spaniards frankly admit that they never had any real cartridge metal until they obtained it from the United States. Formerly in making cartridges the Russians poured their metal into stone molds, but recently they conformed to American usage by resorting to molds of iron, with only moderate success. In their efforts to achieve perfection, the Russians as well as the Turkish, German and French governments have sent officers to examine our works, and men to qualify themselves as artisans, but in all cases they have come short of the object sought, their methods are so different. The conclusion reached is that no cartridges are made that will stand the tests equal to American. The Russians now have their own works, with a capacity of 1,000,000 cartridges a day, which use American sheet metal altogether. The Turks until now have been compelled to get their cartridges from the United States ready made, but they too are striking for independence, having recently purchased machinery for the manufacture of cartridges on an extensive scale. This is now on its way out from the United States in charge of American mechanics, and will soon be in operation, though it is remarked that, having forgotten one of their boilers, some delay must result before the one in preparation at Bridgeport can be forwarded. It is well known that the Russian machinery was obtained from models originally sent out under a contract arranged by Gen. Gortloff ten years ago.

The American manufacturers claim that while foreign governments may become independent as to manufacturing cartridges, they can never supply themselves with metal suited to their requirements, and must always resort to this market for supplies.

American Plated Goods and the Foreign Market.

American manufacturers of plated goods are not in the least discouraged by their experiences thus far in the attempt to open a foreign market. On the contrary, they find motives for persisting more resolutely than before. The senior member of one of our long-established firms, on being approached for information by a representative of *The Iron Age*, at once produced specimens of English spoons in comparison with similar goods made in Connecticut. The former were not only bulky and uncouth every way, but easily bent out of shape. When "stripped" of the outside coating, they proved to be nothing more than the best quality of brass. The excess of metal used gave no corresponding increase of strength. On being asked why this difference, our informant said: "We take the same material and apply a tremendous pressure, condensing the particles of metal until there is brought about the same difference that is observed between hard and soft steel, and thus obtaining elasticity. By the same process there is a saving of one-half in the weight, and the hardened metal is susceptible of a higher finish, precisely as in steel compared with iron. Thus, added to grace of form we secure elasticity and strength, while the finished work carries with it a luster far surpassing anything possible where the softer grades of metal are used."

The American manufacturers hear good accounts from their agents abroad in all parts of Europe. As many goods are sold in England as in Germany. In Canada, as positively stated by one of our most successful manufacturers in this line, our goods take the lead, commanding as high prices as the best foreign. "Yes," interpolated the active outdoor member of the house, "we get better prices than any others." There is no doubt American goods are well received wherever offered, whether in England or Australia. Already the single article of American ice pitchers can be found in all the warm countries of the world, sales having been quite large. One shipment is mentioned comprising 3000 of this now almost indispensable article. Tea sets and castors are also in much request, and plated forks and spoons are considered as actual necessities, felt wherever civilization exists. Nor is the world likely very soon to be surfeited with goods known as hollow-ware and silver plated, as there is an actual wear or consumption of metal equivalent to several tons a day, which is lost and never returns. The aggregate exports of American goods of the general description here referred to, now amounts in value to some \$74,000,000 a year, and there are prospects of indefinite expansion as their superior quality and low cost, in comparison with inferior descriptions heretofore offered in competition, become better known. A few English houses make a class of work not made here, and which for artistic excellence has a wide reputation not enjoyed by any American plated goods, but these goods are very costly, and with the cheaper goods adapted for all classes of trade our plated ware can compete without difficulty both as to quality and prices.

Established
1831.

HAYDEN & SMITH,

First Hame Works
in U. S. A.

AUBURN, NEW YORK,

Manufacturers of

HAMES, SADDLERY AND CARRIAGE HARDWARE.

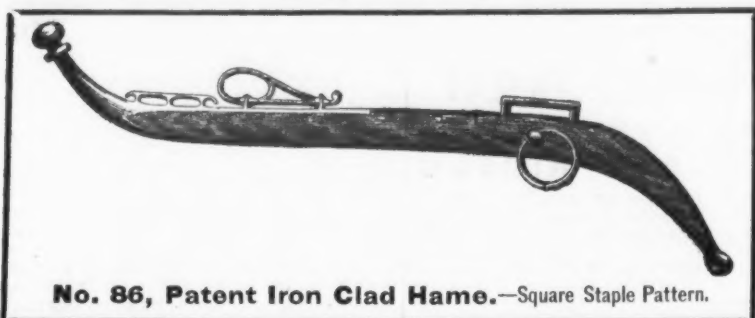
CONCORD HAMES in Polished, C Plate, Silver and Nickel-Plate Styles.

BALL AND HAT TOP HAMES in on Hames of many kinds.

LUMBERMAN BOLT HAMES, Nos. 6 to 12.

SCOTCH HAMES with Hook or Clip.

PATENTED IRON-CLAD HAMES, the Strongest Hame ever made and light weight for Express, Truck and Stage Harness.



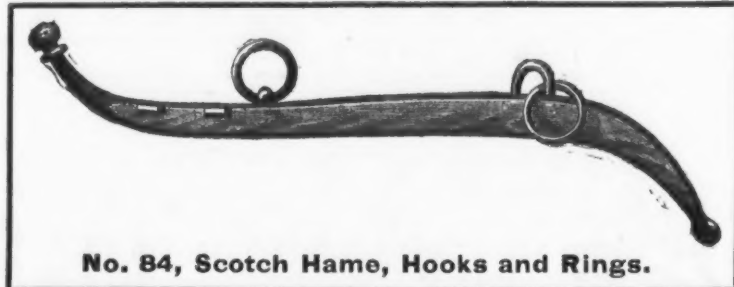
No. 86, Patent Iron Clad Hame.—Square Staple Pattern.



No. 10, Lumberman Bolt Hame, Links and Rings.



Patent Top Loop Hame, with
Hayden Hold Backs.
No. 42, C Plated Top.



No. 84, Scotch Hame, Hooks and Rings.



No. 3, Patent Iron Clad Hame, Rings and Clips.

Also a full line of Japanned, C Plated and Nickel Saddlery Hardware. Sole Manufacturers of the
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Successors to J. CLARK WILSON & CO.,
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SNELL MFG. CO., Augers, Bits & Boring Machines.
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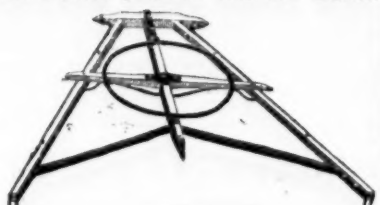
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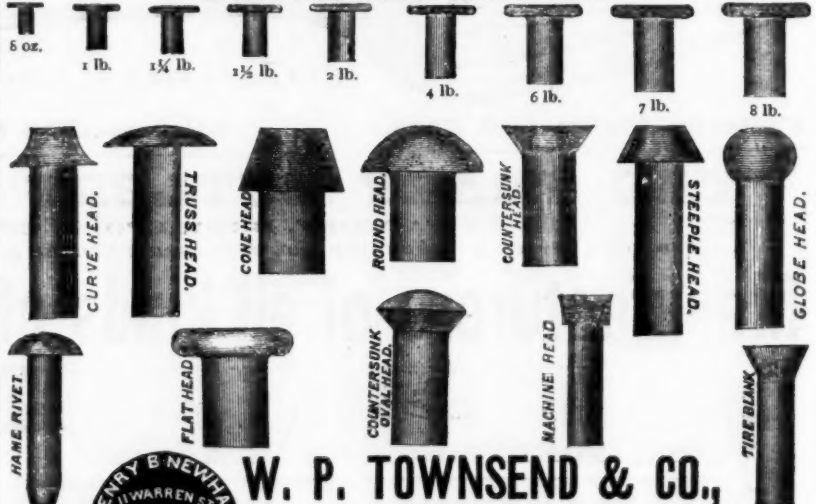
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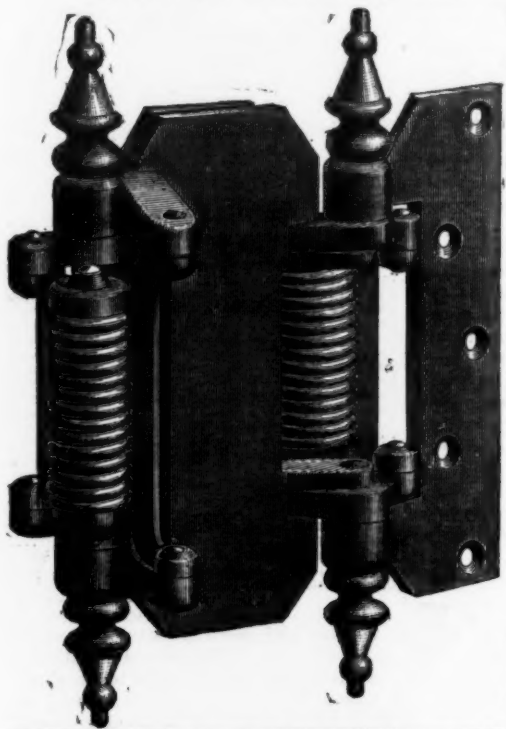
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They exert their greatest force at the closing point.
They will not allow the door to sag.
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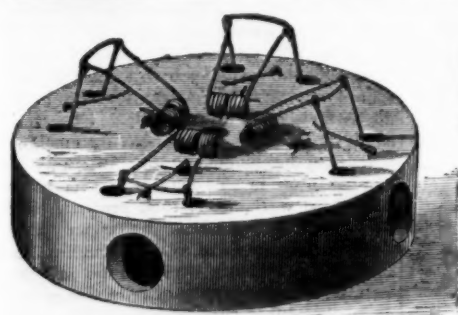
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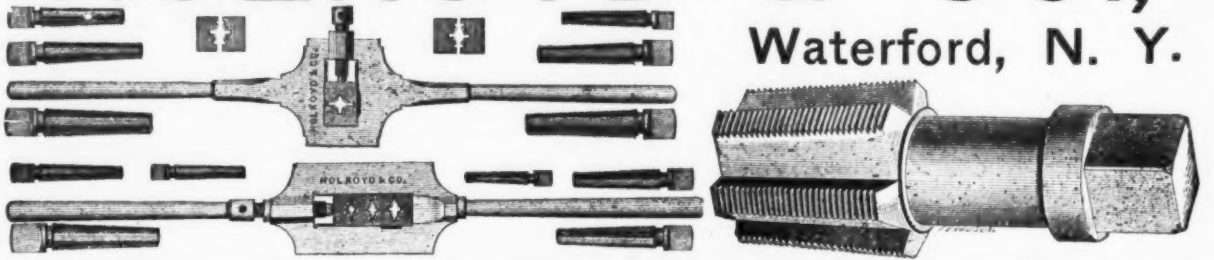
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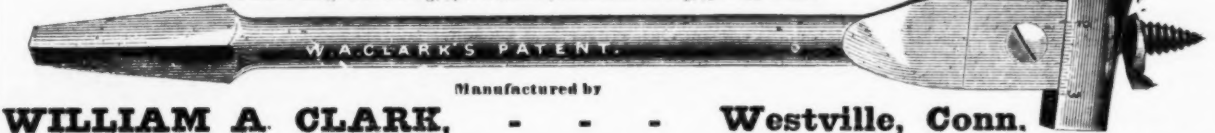
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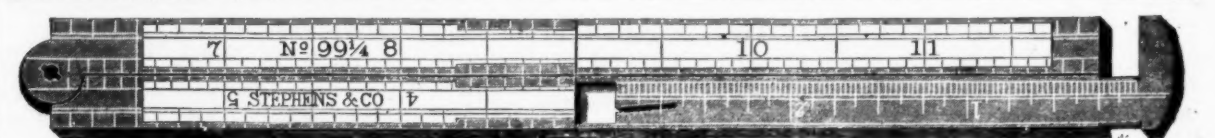


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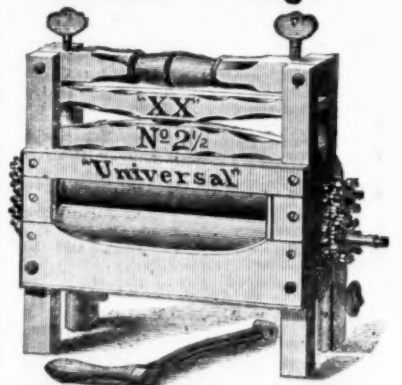
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Over 500,000 sold!

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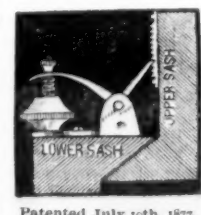
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Sold by dealers everywhere.

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and
Burglar Proof
Window Locks.**

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The Iron Age.

New York, Thursday, July 11, 1878.

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JAMES C. BAYLES - - - Editor.
JOHN S. KING - - - Business Manager.

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One square (12 lines, one inch), one insertion, \$2.50; one month, \$7.50; three months, \$20.00; six months, \$35.00; one year, \$60.00; payable in advance.

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The publishers of *The Iron Age*, 44 Cannon Street, London, England, will receive orders for subscriptions and advertisements on our regular terms.

AUSTRALIAN AGENCY.

The American Hardware Company, Melbourne, are our agents for Australia. Sample copies will be mailed by them, free of charge, to any firm engaged in the trades we represent in Australia, Tasmania and New Zealand.

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Twenty-ninth Page.—Boston and St. Louis Hardware and Metal Prices.

During the past few days the Western commercial travelers have held their annual convention at St. Louis. About five hundred members attended, with representatives of several exchanges, boards of trade and business houses. The proceedings were important, and many questions of general commercial interest were discussed. The growth of associations of commercial travelers shows that the importance of this influential class of business men is steadily increasing. They now have organizations in nearly every State, and, with the excep-

tion of California and portions of the South, their right to do business without special licenses is freely admitted. The results of organization cannot fail to be of benefit in raising the morale of the profession, increasing the efficiency of good men on the road and discouraging the employment of inferior men whose vicious habits and dishonest practices bring their occupation into disrepute. A better class of men cannot be found in business, taking the average, than the commercial travelers of the United States, and they owe it to themselves to exclude from fellowship in their organizations those who are not entitled to recognition as honorable gentlemen.

The Outlook in Europe and America.

The events which have marked the first half of 1878 have been all of such an eminently peaceful nature and so important in their bearings, that the general belief begins to prevail that we are on the eve of a long era of peace and prosperity, and that possibly we may reach the twentieth century without another important war anywhere in the civilized world.

Next to the treaty of Vienna, which gave peace to Europe during nearly half a century—the wars occurring between 1815 and 1854 being of little general importance—the treaty of Berlin, framed by the Congress whose labors are now drawing to a close, is likely to prove the most beneficent in its influence of any document framed during this very eventful century. For the first time since 1815 a sincere effort has been made to arrive at a solid and lasting settlement of a question which has hung over Europe and the East like the sword of Damocles. The promise of permanency in the settlement lies in the nature of the conditions affecting all the great powers of Europe.

In consequence of the restoration of the German Empire and the uncertainty attending the future policy of that state, Europe has been converted into a vast camp, entailing enormous expenses for the armament and maintenance of the great military organizations deemed necessary. Every other interest has been sacrificed to this ruinous ambition of military power, born of mutual distrust among the nations. The maintenance on a "peace footing," as it is termed, of armies of 600,000 to 800,000 men had become a seeming necessity, and when the finances of the powers were exhausted great debts were created, burdening industry and heavily mortgaging the future earnings of labor. Such a state of affairs was fraught with danger, for, becoming intolerable to the masses of the people, it was breeding revolution of the most formidable kind, not only against the state but against society. The two attempts to assassinate the German Emperor at Berlin clearly showed whither a continuation of this grinding system of military extortion must inevitably lead, and set the statesmen of the Old World to thinking. Hence the supreme resolve to come to an agreement by which disarmament could be secured without danger to the weaker powers from the ambition of the stronger. Alexander II and his advisers seem to have desired such an agreement, partly from a wish to conform the results of his late war to the satisfaction of Europe, and partly from the discovery that Great Britain, which as an Asiatic power has gained vast importance, possesses in her native soldiery in India a formidable weapon which, judiciously used, might make sad havoc in Europe. India, instead of being a vulnerable point in the British Empire, is now declared by military men to be an inexhaustible source of valuable loyal strength. The bold and masterly policy of the Earl of Beaconsfield has had a brilliant success, placing him in the front rank of European diplomatists, the peer of Gortschakoff, Bismarck and Andrassy. By dexterous management he has accomplished more than war, backed by all her ironclads and a million of troops from India, could have secured to his country.

Turkey, as was to be supposed, has been handled rather unceremoniously in the arrangement, but she has herself to blame for it and nobody pities her. What is of greater importance to Europe and America than the territorial rearrangement that has been going on, is the fact that great moral and material results have been reached, and that the closing years of this memorable century witness the firm establishment of the principle of arbitration in international differences, a general disarmament, and the triumph of the artisan over the soldier—of production over destruction. A more liberal spirit and the great advancement of science and invention, the all-absorbing importance of commerce and the industries which give it life, have now consolidated the interests of all civilized nations. A lasting pacification of Europe is, therefore, as important to ourselves and all other non-European nations as it is to Europe herself. With the dismemberment of standing armies vast numbers of idle consumers will be returned to the useful arts, and if Europe has an excess of labor we shall attract immigrants. The tendency is manifestly in this direction. The number of our immigrants from some cause is again on the increase, and the new comers find the United States in a much better condition for their reception than they would have found it a few years ago. This change is principally due to the flourishing state of our agricultural interests. We have been piling one abundant grain crop upon another, and that of 1878 is represented as

being larger than any of its predecessors. The same may be said of cotton, which promises a yield of between 5,000,000 and 5,500,000 bales, if not curtailed by unusually early frosts. The hog crop gives promise of a yield even more exuberant, perhaps, than that of 1877, which, in spite of an enormous demand for Europe and tropical America, brought prices down to the low figures of 1842, so astoundingly large was it. In petroleum the boring of new wells is incessant, and even the Bradford district in this State now turns out 4000 barrels of crude oil daily.

Our progress in the mining and smelting of the precious and base metals has been keeping pace with our advancement in the various branches of raw material just alluded to. We are producing gold and silver together at the rate of \$100,000,000—in other words, we are adding to the wealth of the nation in this item alone at a rate largely in excess of the palmiest days of early gold discoveries in California, unaccompanied by an unwholesome public excitement displacing labor and disorganizing other interests. In the base metals we are producing in excess of home requirements, and have for some time past been relying on Europe and the East to take off our hands the growing surplus. This relates more particularly to copper, lead, spelter and quicksilver, which are less ruled by freight rates for exportation than iron, steel and coal.

Our export of nearly every kind of raw produce has of late years been steadily expanding. In many of our statistical labors we have followed this progress step by step, and the handsome result of our activity in most departments of industry and commercial enterprise is that the so-called trade balance is running in favor of the United States at the rate of about \$400,000,000 per annum.

Our manufacturing interests seem to be in a transition state. During the ten years ended with 1872 our progress was made with strides so long and so rapid that we shall be occupied for five years to come, at least, in retracing our steps and looking after a thousand great and small economies very generally disregarded in more prosperous times. The results are already seen in a cheaper and more systematic production and a gradual but steady progress in the adaptation of machinery to every process. In this respect, at least, the Centennial was fruitful of good results. It taught our manufacturers many things which they had failed to learn from experience, and gave them a practical insight into methods and processes employed in countries where close and scientific economy is the only condition of success in manufacturing. It also impressed our manufacturers with the necessity of securing foreign outlets for their products, and opened the way for efforts since put forth with gratifying success. We have learned that with the mechanical aids which we best know how to employ, native skill and abundant and cheap raw materials, we can compete successfully with Europe in many important departments of trade. Our British and Continental rivals have but two points of advantage—abundant capital and cheap freights. In available capital and the credit it commands, Europe will have an advantage for many years to come. The same will be true of ocean freights until we can establish and maintain steam lines plying between our ports and our markets. In spite of these obstacles, however, we are making good headway, and everything warrants the belief that we can hold and steadily increase our advantages already gained. The decline in values to a specie basis gives stability to whatever results are now secured by individual activity and commercial enterprise, which is certainly a great point. If, therefore, the world is entering upon an era of peace and general prosperity, of re-established confidence and material progress, it is gratifying to know that we are ready for the change and in a position to take advantage of whatever influence may impart an impetus to the arts of peace. If our chief competitors enjoy an advantage over us in the matter of cheap capital and low freights, we have in our favor an unequalled geographical position on both oceans, a wealth of resources and a skill in their development and utilization which must command for us a first place among the great producing nations of the world. Everything warrants the belief that we are approaching, in common with the people of Europe, a period of healthy readjustment in trade matters, and that what we have learned during our long season of depression and shrinkage will so far redound to our advantage that it will be worth all it has cost us.

Prince Bismarck is too good a statesman to be consistent to an error when he discovers his mistake. On the subject of free trade and protection he says: "I have given free trade a fair trial, and it does not seem to have benefited the country, commercially, industrially or financially. I am overwhelmed with lamentations respecting the decline of trade and the decay of manufacturing enterprise, and with assurances—from people for whose judgment in such matters I entertain the highest respect—that partial and moderate protection will remedy these evils as if by magic. Therefore I also propose to give protection a chance of ameliorating the condition of the manufacturing and operative classes, and of lightening the load which the budget unquestionably lays upon the shoulders of the nation. As

"certain of the ministers with whom I have hitherto worked on my former platform will not range themselves by my side on my new platform, I must rid myself of them and get others in their place who will carry out my resolves." Germany has been governed too much by theory since 1870, and if Prince Bismarck will shape the policy of the state henceforth with reference to the requirements of the nation's industries and the demands of the people, he will not lack popular support whatever his difficulty in securing the co-operation of his cabinet.

Our Trade with Sweden and Norway.

Since Sweden and Norway became a joint monarchy in 1814, though under a separate administration, their material interests have been rapidly developed, as the following increase of trade will show:

	Import.	Export.
1830.....	\$6,800,000	\$4,500,000
1831.....	4,900,000	5,300,000
1832.....	5,900,000	5,700,000
1833.....	5,600,000	6,800,000
1860.....	22,670,000	23,350,000
1874.....	28,830,000	63,000,000
1875.....	74,370,000	55,760,000

	Import.	Export.
1828.....	\$1,800,000	\$1,400,000
1833.....	2,400,000	3,800,000
1874.....	20,160,000	39,720,000
1875.....	47,750,000	27,940,000

The Scandinavian Peninsula, next to the Iberian, is the richest metallurgical country of Europe, abounding in iron, copper and zinc, and is at the same time well timbered. Its coasts abound in fish, and its forests in fur-bearing animals. The climate is in part mild and in part very severe; its soil is, on the whole, not remarkable for its fertility, but the country is well watered, having on the other hand the drawback of being too mountainous. For purposes of trade, Scandinavia is admirably situated, and has at all times been renowned for its daring seamen. The population is physically vigorous and very industrious. During the past twenty years numerous Scandinavian immigrants have arrived in this country, and are generally acknowledged to be a desirable accession to our middle and working classes. Most of them have settled in the West.

Sweden has an area of 170,582 square miles, and Norway 122,280, making together 292,862 miles. The former counts a population of 4,429,713, and the latter of 1,807,555; together, 6,237,268 inhabitants. The Swedish army numbers on a peace footing 36,495 soldiers, and that of Norway 12,750; together, 49,245. The Swedish navy consists of 40 steamers, of 5693 horse-power, with 152 guns, and is manned by 5051 officers and men. There are besides 10 sailing vessels and gunboats, with 213 guns. Norway has 32 steamers, with 2750 horse-power and 156 guns; there are besides 5 sailing vessels and 86 gunboats, with 146 guns.

The following statistics will best show the material progress of Scandinavia during the past few years:

	Sweden.	Norway.	Total.
Railroads, miles.....	2,517	368	2,885
Cost of do.....	\$156,836	\$22,231,307	\$178,557,233
" per mile.....	62,108	61,519	61,814
Post offices.....	1,844	824	2,668
Letters for'd.....	24,400,000	11,200,000	35,600,000
Telegrams.....	18,975,727	9,428	9,428
Do. wires.....	4,974	4,428	9,402
Do. offices.....	12,179	8,175	20,354
Do. messages sent.....	347	127	474
Do. per 100 inhabitants.....	1,105,000	749,000	1,854,000
Letters per capita of the population.....	25	41	61.5

One of the leading interests in Scandinavia is that of shipbuilding, as shown in the following figures:

	Sweden.	Norway.	Total.
Under Swedish flag.			
Sailing Tonnage.....	1,100,000	1,100,000	2,200,000
Steam Tonnage.....	1,100,000	1,100,000	2,200,000
Under Norwegian flag.			
Sailing Tonnage.....	1,100,000	1,100,000	2,200,000
Steam Tonnage.....	1,100,000	1,100,000	2,200,000

These ships were manned in 1873 by 24,732 men.

Under the Norwegian flag there were, Dec. 31, 1875, 7814 vessels, with a tonnage of 1,394,563 and 60,281 men, and Dec. 31, 1870, 6993 vessels, with a tonnage of 1,007,908 and 49,037 men.

MARITIME MOVEMENT OF SWEDEN IN 1875.

	Entered with cargo.	Sailed with cargo.
Vessels.....	10,542	7,957
Tonnage.....	510,542	763,632
Swedish.....	678	180,210
Foreign.....	3,151	583,422

Total..... 6,571 1,197,579 14,570 2,132,538

	Swedish and foreign.	Swedish and foreign.
Arrivals.....	1,100,000	1,100,000
Departures.....	1,100,000	1,100,000

Total..... 6,571 1,197,579 14,570 2,132,538

SCANDINAVIA'S COMMERCE IN 1875.

	Sweden.	Norway.	Total.
Imports.....	1,100,000	1,100,000	2,200,000
Exports.....	1,100,000	1,100,000	2,200,000

Total..... 6,571 1,197,579 14,570 2,132,538

	Sweden.	Norway.	Total.
Imports.....	1,100,000	1,100,000	2,200,000
Exports.....	1,100,000	1,100,000	2,200,000

Total..... 6,571 1,197,579 14,570 2,132,538

The figures in this line show the inter-state trade between the two countries.

The foregoing shows that as usual England has the lion's share of the entire trade. Even with rails the English have supplied Scandinavia quite extensively of late years, as shown below:

	1876.	1877.
Iron.....	\$1,238,740	\$1,347,920
Steel.....	183,160	708,605
Total.....	\$1,421,900	\$2,056,525

Our own trade with Sweden and Norway fluctuates widely. At times when everything was flourishing among us and we were building our great railway system, we imported enormous amounts of iron and steel from Sweden, but gradually the domestic article almost wholly superseded the Swedish. Whenever Scandinavia is short of grain we ship rye and other cereals largely; when crops there are sufficient for the wants of the population they draw little from here. Cotton they take steadily, and petroleum is becoming a most important article in our traffic with the northern twin kingdom.

The following table shows the general commerce we have been carrying on with those regions since the war:

OUR SCANDINAVIAN TRADE.

Fiscal Year.	Import.	Domestic Export.	For'n Export.	Total Trade.
1864.....	413	113	3	527
1865.....	733	184	6	923
1866.....	468	159	7	634
1867.....	944	125	4	1,073
1868.....	1,227	207	27	1,461
1869.....	1,104	167	..	1,271
1870.....	1,181	106	..	1,287
1871.....	1,189	3,310	..	4,499
1872.....	1,771	742	..	2,513
1873.....	2,598	2,542	..	5,140
1874.....	2,038	2,385	1	4,424
1875.....	548	888	..	1,370
1876.....	348	1,461	5	1,814
1877.....	244	3,242	13	3,499

The following has been our import from Sweden and Norway:

	1876.	1877.
Books.....	\$2,122	\$1,621
Fish.....	2,793	7,386
Pig iron.....	6,802	3,761
Bar.....	295,202	164,478
Hoop.....	6,031	.....
Manufactures iron and steel.....	18,636	2,700
Scrap iron.....	2,189	30,688
Jewelry.....	1,416	9,557
Paintings.....	1,011	1,011
Furniture.....	1,889	1,889
Other goods.....	15,527	15,527
Total.....	\$347,945	\$243,566

The following are the details of our domestic exports:

	1876.	1877.
Mowers and reapers.....	\$40,530	\$33,890
Other agricultural implements.....	1,800	12,101
Indian corn.....	11,875	45,079
Rye.....	19,188	217,693
Railroad cars.....	23,191	6,590
Manufactures of hemp.....	2,912	.....
Cotton.....	949,888	811,180
Tobacco.....	1,516	.....
Leather.....	2,687	.....
Resin.....	5,426	13,922
Petroleum.....	347,251	1,243,644
Bacon and hams.....	469,801	.....
Beef.....	4,315	.....
Fish.....	6,500	.....
Butter.....	11,243	105,822
Lard.....	2,118	.....
Spirits of turpentine.....	2,130	.....
Spirits of turpentine.....	2,130	.....
Sailing vessels.....	11,100	1,300
Woodware.....	6,590	9,990

when the best British marksmen are supplying themselves with American rifles, when American watches are selling in every market of Europe, when American electrical apparatus is astonishing the world, when our machinery, including locomotives, is going abroad by the shipload, and when our exports in nearly every line are growing in favor with foreign consumers because of their superior excellence of quality, shape and finish, such a remark from Prof. Goldwin Smith would indicate a greater aptitude on his part for the digestion of thistles than for the observation of facts. We should be very glad to believe that our English friends would accept his statement as true. Nothing would help us more than for them to delude themselves with the notion that we cannot compete with them in the higher products of manufacturing industry.

In only one sense is Prof. Smith's remark correct, and that is a sense in which it is probable he did not mean it to be taken. In the department of industrial art our work is not up to the best foreign standards. We have made good progress in this direction since the Centennial, but there is still great room for improvement. What we most need just now is a system of art education which shall teach drawing and shape the taste of the rising generation. We need more artisans—mechanics who can apply the principles of art in their work. Seed has already been sown which will bear good fruit in the future, but our manufacturers are not yet fully alive to the importance of art in its every-day applications, and we have not now an adequate supply of the material out of which art workers can be made.

Shall the East River Bridge be Abandoned?

It is rather late in the day to begin to consider whether the great suspension bridge over the East River shall be completed or abandoned, but this question is attracting a very considerable share of public attention just now, and it is by no means certain which way it will be answered. In the estimation of a great many interested property owners it would be a wise and economical policy to abandon the bridge at once, to secure the repeal of its charter and undo the work already done. It is believed by many that should the bridge be completed it will prove a permanent and serious obstruction to commerce, and that rather than incur the expense and delay of lowering the topmasts of their ships, owners will seek other ports. Another and serious objection to the bridge grows out of its enormous, but still uncertain, cost. When the work was begun it was believed that \$3,000,000 would finish it. This was soon found to be wholly insufficient. The estimates were increased to \$8,000,000, then to \$12,000,000, and now it is quite impossible to say what it will cost. Some estimates place the total as high as \$20,000,000; and it requires but little calculation to show that, having absolutely no commercial importance, anything approximating this amount is vastly more than the finished bridge will be worth to the two cities connected by it.

The subject has lately been taken up in a very practical way by an organization known as the Council of Political Reform, and its members have already begun an effort to prevent any further appropriation of public money on account of the bridge. Their ostensible object is to prevent any increase of the public debt for purposes which contribute nothing to the true interests of the city. There remain some legal questions to be decided yet, and before these points are disposed of they say that it is unsafe to go on spending money that may be thrown away. One point is, is not the bridge going up in violation of the laws of this State and the United States prohibiting the obstruction of navigable rivers? Another is, are not the bridge trustees violating the law that created them in exceeding the amount of money they were authorized to use? If the Board of Apportionment persist in appropriating money beyond the prescribed amount they will become personally responsible, say these gentlemen, and if there is any force in the law preventing the obstruction of rivers, the money already spent is wasted and it will be foolishness to spend more. A careful investigation has been made by them, with the aid of competent engineers, and they have found that the bridge will prove to be a serious obstruction to commerce. When Congress granted permission to build the bridge, it did so with the distinct understanding that it was not to be an obstruction. As it looks now, enough has been shown to the opponents of the bridge to convince them that it will destroy a large part of the commerce of the East River and reduce the value of the dock property. It is feared that when the bridge cables are in place no commerce will be found above the bridge, and as but little space remains on the New York shore below Fulton street for shipping—the canal boats and fishing smacks occupying permanent places—the bridge will injure all the dock property on the New York side lying above Fulton street. The cables, they say, will be an obstruction to all vessels with masts over 115 feet high, and as many schooners—to say nothing of barks and brigs—have masts higher than this, they will all be affected by the obstruction. Some of the figures presented in their argument may be briefly summarized as follows: During last year 19,534 sea-going vessels entered this port, nine-tenths of them with

masts above 115 feet in height. Of coastwise vessels 14,527 came to New York and 10,413 entered the port through Hell Gate. Many of them came and went several times. If these vessels were obliged to shift their spars every time they passed the bridge, at an expense of \$150 to \$1500, they would soon be compelled to seek entry by another channel than that which runs under the bridge. Schooners manned by small crews cannot, in the crowded condition of the river and the limited number of men carried as crews, get through with any sort of expedition. Yet 12,404 of the vessels included in the coastwise trade were schooners.

Pending the decision of the legal points raised, the Council of Political Reform urge still other considerations which are not without weight. They insist that the bridge, if finished, would possess but a limited utility. The practicability of using it for the passage of engines and cars is said to be questioned by the Chief Engineer. Its approaches are inconvenient of access, and the only time it would accommodate any considerable number of people is when the river is temporarily obstructed by ice. This happens only occasionally—not many times in one winter—and at such times the bridge could not accommodate the travel which would seek to pass over it. These are some of the objections urged by the Council against any further expenditure on account of the bridge, but there are many others which, if less important, are not without weight. One of them is that to accommodate the travel to and from the New York approach it will probably be necessary to project a wide street through the City Hall Park, thus destroying one of the few parks remaining in the lower part of the city. It is also claimed that the bridge will, in any event, be of benefit chiefly to Brooklyn, and that New York's share of the cost will be paid to her detriment in many ways.

We have reason to believe that the gentlemen connected with the Council are thoroughly in earnest in their opposition to the bridge, and that they are sustained by public opinion. Few people will deny that the bridge was a blunder in its inception, that it can never approximate the payment of interest upon its cost, and that it has no value as a public work which would justify its creation at public expense. The loss of so large an investment as is represented by the work already done is certainly to be regretted, but whether that is not better than throwing some millions more of good money after it, is a question which certainly merits very careful consideration from tax-payers, whose burdens are already onerous.

An extraordinary shipment of war material is reported. The steamer J. B. Walker has just received on board at New Haven a cargo of firearms and cartridges valued at \$2,000,000, under orders from the Turkish government. Her destination is Constantinople, and this is the most valuable cargo ever sent to that port from the United States, being another installment under the old contract. The number of rifles is 75,000 and the cartridges number 20,000,000. It is probable that further shipments will be made soon, as the full cash amount called for to complete the contract has already been paid. Since the beginning of these shipments there have been sent out under contracts with the Ottoman government no less than 29 cargoes, of which 16 were by steamers, and the amount of cash received in payment reaches a total of \$27,000,000. We may also add that there was recently shipped for the Turkish government complete machinery for the manufacture of cartridges, and a boiler forgotten or in some way omitted from the calculation will soon be forwarded from Bridgeport, Conn. As the Turks have an arsenal for this purpose, and for the repair of guns, in charge of a master mechanic from Scotland, assisted by young men who served their apprenticeship in the United States, the Turks will be fairly provided for.

At the office of the Brazilian Consulate the statement was made yesterday to a representative of *The Iron Age* that trade by the new steam line has opened very fairly, and that all reasonable expectations are likely to be realized. The English and Germans have a firm hold in Brazil, and will struggle hard before yielding their position. The English sell on six, twelve or eighteen months' credit, and are satisfied if they receive interest on the cost of their goods. The Americans, it was said, could not reasonably expect to establish themselves in the Brazilian market under three years. We learn that quite a large order for steam engines consuming a peculiar kind of fuel has been received from Brazil by a firm in this city, who remark that they do not propose to "give themselves away" by telling their competitors about it.

Gen. Newton, superintending engineer of the proposed ship canal to connect Spuyten Duyvil Creek at the Hudson with the East River at Harlem, for which Congress made an appropriation of \$300,000 to begin work upon, says that nothing can be done until an undisputed right of way has been ceded to the government without costs. Bridge builders and others who are looking for fat jobs from this source must possess their souls in patience.

Secretary Sherman yesterday took a run through the Sub-Treasury, looked in at the

Custom House, and soon disappeared for Manhattan Beach, it is reported. His business is supposed to be with the banks, but in banking circles he has not yet been heard from. It is hoped that he will soon obtain from the proper authorities the needed cession of land, so as to commence building the proposed barge office for the landing of foreign passengers.

A report came from San Francisco yesterday to the morning papers that the Sutro tunnel had been cut through to the Comstock lode, constituting the great event of the period in mining circles. The agent of the Bank of Nevada informed a representative of *The Iron Age* that they "had no such information," but the grand project referred to cannot be far from a successful termination, even if prematurely announced.

An officer of the Metropolitan Railway Company, which yesterday held their first meeting under the new board of directors, remarks that they have not decided whether to go on and finish the west side at once, as originally intended, or push work on the east side simultaneously. To suppress the noise of the trains is their first object.

Yesterday, at the coin department of the United States Sub-Treasury, surprise was occasioned by the presentation of a counterfeit silver dollar, the first seen. It was received by the keeper of a German restaurant down town, and was so well executed that only the lightness of weight excited suspicion that it might be spurious.

A consular dispatch on another page gives further interesting information respecting our trade with Germany. It will be found of value.

Mr. Seward's monograph on the metallic currency of China, the first of which we print elsewhere, is an important paper and contains a great many interesting facts respecting the assaying of precious metals and the minting of coins in the Flowery Kingdom.

Scientific and Technical Notes.

Before the Société d'Encouragement Mr. C. Vincent described the use of chloride of methyl as an agent for the

PRODUCTION OF LOW TEMPERATURES FOR LABORATORY USE.

The apparatus consists essentially of a cylindrical copper vessel with double sides. Between these the liquid chloride of methyl is introduced by means of a special cock formed of a threaded bar, the conical end of which fits into a bronze seat. The inner vessel is filled with alcohol, forming an unchangeable bath. In order to bring about the evaporation of the chloride of methyl, all that is necessary is to open the cock, allowing the vapors free escape into the air. This causes the temperature of the alcohol to sink to 10 degrees below zero, which can be maintained for hours, until all the liquid is evaporated. By applying suction the evaporation of chloride of methyl may be so accelerated that the temperature falls considerably. Mr. Vincent has repeatedly succeeded by this simple means in obtaining mercury crystals. The apparatus possesses the advantages of extreme simplicity and ease of application.

Mr. S. Meredith, of Edgbaston, England, has patented an improved method of preparing

AMBER VARNISH.

Yellow amber is bleached by being treated with a hot solution of salt; the white product is dried, powdered and melted over a fire in a clean iron pot. As much fine nut oil as will make it into a varnish is then added, after which the whole is well stirred until thoroughly mixed. The pot is then removed from the fire, and when the heat has sufficiently moderated, essence of turpentine is added to form a composition of the proper consistency for use. The following proportions answer well: White amber, 1 lb.; fine nut oil, 1 lb.; essence of turpentine, 2 lbs.

The bending of hard wood, especially beech, is effected at present by means of hot water or steam—a process somewhat costly as regards fuel, and taking a long time. For overcoming these difficulties by

BENDING WOOD IN A DRY STATE.

Messrs. Bahse & Haendel have proposed the following method, chiefly for sieve hoops: Two rollers are used, one above the other, the upper one having less velocity, so that it acts by holding back, while the lower extends the wood fibers. When the board, thus bent, leaves the rollers, it is fastened in the mouth of the sieve. The upper roller is fluted, the under one smooth. If two smooth rollers were used a very much greater pressure would be necessary.

The *Chemische Centralblatt* calls attention to the frequency and danger of

EXPLOSIONS CAUSED BY DISSOLVING ZINC IN HYDROCHLORIC ACID.

At Ludwigshafen, where large quantities are dissolved for the production of chloride of zinc, explosions have often happened, even when the air of the work room did not come in contact with fire. Hofmann explains the phenomenon thus: The hydrogen gas developed raises the zinc, made very porous by action of the acid, above the surface of the liquid, so that the finely divided zinc, in contact with air and hydrogen, causes, like spongy platinum, the inflammation of the gas mixture. A similar experience was had in the chemical works of Schering, in Berlin, some years ago, but was not explained. It is recommended to effect the dissolution of large quantities of zinc in dilute acids in open, rather than closed vessels, so as to weaken the force of any such explosions.

Mr. W. H. Carmont, of the Cyclops Iron Works, Openshaw, England, has invented a process for

UTILIZING STEEL SCRAP

by piling it and combining therewith steel or iron turnings. The pile is then put into

a furnace and heated in the same manner as a common wrought scrap iron pile. During the heating of the pile of steel scrap a portion of the steel or iron turnings becomes oxidized and runs through the mass, thereby causing a flux that welds the steel scrap together; the action of this flux partially decarbonizes the steel scrap. The bloom or slab thus produced can be rolled or forged to any shape, or any number of slabs thus produced can be piled together to form heavy forgings which possess the strength and polish of steel with the ductility of iron. By varying the proportion of the steel or iron turnings to the steel scrap he produces either iron or steel of a mild quality.

Prof. S. Jordan, of Paris, has recently demonstrated the great

VOLATILITY OF MANGANESE

at temperatures by no means very high. He was led to his investigations by the fact that in manufacturing cast manganese with known weights of the substances employed, it is always found that there is a considerable loss of the metal which is not recovered in the scoriae.

Powdered saponaria added to even the lightest petroleum oils produces the

SOLIDIFICATION OF PETROLEUM.

On digesting the powder in water and mixing it with the oil the latter forms a very thick mucilage, so that the flask in which the experiment is made may be inverted without its contents flowing. It is still more singular, says the *Scientific American*, that if a few drops of carbolic acid be added and the mucilage agitated it becomes in a few minutes perfectly limpid.

The bulletin of the Belgian Photographic Society contains a description of

SCAMONT'S PROCESS OF PHOTO-ENGRAVING.

The originals to be reproduced are carefully touched up, so that the whites are as pure and the blacks as intense as possible, and then the negative is taken in the ordinary way, the plate being backed in the camera with damp red blotting paper to prevent reflection from the camera or back of the plate. The negative is developed in the ordinary manner, intensified by mercuric chloride, and varnished. A positive picture is taken in the camera, the negative being carefully screened from any light coming between it and the lens. This is intensified by pyrogallol acid and afterward washed with pure water to which a little ammonia has been added. It is then immersed in mercuric chloride for half an hour and again intensified with pyrogallol acid. This is repeated several times. When the intensity of the lines is considerable the plate is well washed, treated with potassium iodide and finally with ammonia, the image successively appearing yellow, green, brown and then violet brown. The plate is then thoroughly drained and the image is treated successively with a solution of platinum chloride, auric chloride, ferrous sulphate and finally by pyrogallol acid, which has the property of solidifying the metallic deposits. The metallic relief thus obtained is dried over a spirit lamp and covered with an excessively thin varnish. This varnish, which is a special preparation, retains sufficient tackiness to hold powdered graphite on its surface (the bronze powder now used may be employed instead), which is dusted on in the usual manner. After giving the plate a border of wax it is placed in an electrotyping bath, and after a few days a perfect *fac simile* in intaglio is obtained.

In a recent interesting historical paper upon "Destructive Earthquakes in Japan," Mr. Hattori, of the University of Tokio, gives the following description of a curious

EARTHQUAKE INDICATOR.

invented by Choko about 132 A. D. It consisted of a copper vessel, the diameter of which was eight shaker or feet, and whose convex cover was ornamented with characters, mountain turtles, birds and beasts. In this vessel there was one main piston in the middle with its eight branches, wires and springs. On the outside of this vessel were eight dragon heads, each of them having a copper ball in its full opened mouth. Under each of the dragon heads there was a frog looking upward with its mouth fully opened. The wire works and springs were very skillfully arranged in the vessel, but the cover was closely fitted, and they could not be seen. Whenever the earth shook one of the dragons dropped the ball, the frog underneath received it in its mouth, and produced a sound. By this means the direction of the shocks was ascertained. Once one of the dragons dropped its ball, but no person near it perceived any shock, and all the learned men of the capital doubted the trustworthiness of the machine; but after a few days a mail arrived from Rosei and reported the occurrence of an earthquake there.

At Astoria, N. Y., a trial plant has been erected to test the

ADAMS GAS PROCESS.

Four ordinary gas retorts compose a set, two operating together. While one retort just charged is yielding the products of distillation of coal, chiefly ammoniacal liquors and coal tar, the second is highly heated. Into this the products of distillation are conducted, together with steam and petroleum vapor. They are there decomposed, forming gases fit for illuminating purposes. As soon as the first retort has reached a higher temperature and the second is exhausted, a valve controlling the communication between them is closed and the second retort is cleared and filled with a fresh charge. The first retort now assumes the part played by the second before. The petroleum is evaporated by flowing over an inclined gutter in the fore part of the retort. The steam required is superheated in the flues of the furnace. The gases generated pass off through a stand-pipe attached to the off end of the retort. They are forced through a mixture of water and gelatine in the hydraulic main to purify them.

Lippmann observed the phenomenon that electrical tension is generated at the contact of quicksilver and water in capillary glass tubes. Based upon this, Breguet and Lippmann constructed a

NEW TELEPHONE.

The instrument consists of a fine glass tube some inches long, which is filled alter-

nately with drops of quicksilver and of acidulated water. Both the ends of the tube are closed by being melted; they are pierced, however, by platinum wires, which touch the nearest drop of mercury. A thin disk of pine wood is attached in the middle at right angles to the tube, thus constituting a plane which may be held to the ear when the apparatus serves as a receiver, and which also transfers to the tube a sufficiently large surface when it acts as a transmitter. The instrument is claimed to be almost independent of the resistance of the conducting wires.

An instrument less widely used than its value would warrant is the

TELAUTOGRAPH.

an ingenious application of the same general principles as Morse's telegraphic alphabet. A message is written by the sender in an ink which does not conduct the electric current, and the paper is placed in such a position that a style, or metallic pencil, drawn by machinery across the sheet, covers it with an infinite number of lines, drawn so closely as at first sight to produce the effect of almost continuous coloring, the letters remaining uncolored. Whatever is done at one end of a telegraphic wire can be repeated with ease at the other, and a *fac simile* of the original is inscribed simultaneously, and by the same means, at the receiving station. Thus, an autographic message with recognizable signature—or a telegraphic cheque—may be instantaneously transmitted by any telegraph fitted with the proper apparatus. This system is actually employed on at least one Italian line, and it seems somewhat strange that, considering its extreme simplicity and the great convenience of a recognizable autograph, the use of such a process has not become more general. The possibility of deception and the impossibility of automatic unquestionable record, such as the copying-press gives to letters, greatly restrict the use of the ordinary telegraph by men of business; and both inconveniences are removed, it is said, by the employment of telautography.

M. Babinet, of the French Academy, gives the following test for

DISTINGUISHING COLORLESS GEMS FROM DIAMONDS.

If a person looks through a transparent stone at any small object, such as the point of a needle or a little hole in a card, and sees two small points or two small holes, the stone is not a diamond. All white, colorless gems, with the exception of the diamond, make the object examined appear double. In other words, double refraction, whenever exhibited by a stone, is proof conclusive that it is not a diamond.

An explanation of the presence of

CHLORIDE OF MAGNESIUM IN SALT WATER LAKES.

in large quantities, and the occurrence of carbonate of soda in nature, is given by M. Cloez. He bases it on the fact, proved by experiment, that carbonate of soda may be artificially produced by the action of carbonate of magnesia on chloride of sodium at ordinary temperatures.

In a communication addressed to the French Academy of Sciences, M. Garrigou states that he has discovered some striking peculiarities in the

SALTS IN MINERAL WATERS.

He has found by researches, the details of which are soon to be published, that the salts dissolved in mineral waters differ in their chemical reactions from the same substances when studied under ordinary circumstances. He concludes that saline substances are susceptible of true allotropical changes.

Prof. Fridolin Sandberger, of Würzburg, Germany, has detected

TIN IN MICA.

in a recent course of analyses, continuing his researches on the presence of the metal in granites, syenites and other rocks, and its relation to metalliferous deposits found in them. He submitted five grains of mica from Paris, Me., Rozema in Moravia, Penig in Saxony, Utoen in Sweden, to analysis, and found that by dissolving them and precipitating the hydrochloric acid solution with sulphuretted hydrogen, a yellow precipitate was immediately formed which proved to be pure sulphide of tin. Mica in many cases seems, therefore, to have been the original source of tin ore, cassiterite, which, as the pseudomorphs of orthoclase prove, was undoubtedly deposited from a more complicated compound by a hydro-chemical process.

Prof. Edwin J. Houston and Elihu Thomson have recently applied the microphone for

RELAYING THE TELEPHONE.

by attaching a miniature microphone to the plate of the receiving telephone. It consists essentially of three small pieces of carbon about $\frac{3}{8}$ of an inch in length, arranged exactly in the manner described by Prof. Hughes. Owing to the extreme sensitiveness of the microphone it is necessary to carefully shield it from all extraneous sounds, which may be done in several ways. If it is desired to diminish the sensitiveness of the instrument, it is only necessary to incline the upright carbon piece, as the sensitiveness of the microphone is greatest when that part is in a vertical position. If, on the other hand, the sensitiveness of the instrument must be increased, a number of minute microphones are substituted for the single one on the receiving diaphragm.

In a recent communication to the *Allgem. Polyt. Zeitg.*, Trauz Bittgenbach gives a very simple means for

JACKETING STEAM PIPES.

A few strips of hoop iron, to the lower sides of which strips of wood are secured, are fastened in a position parallel to the longitudinal axis of the pipe by turning their two ends over at right angles, and firmly screwing these ends between two adjacent flanges. The framework thus obtained around the pipe is covered by a sheet of roofing paper, with the exception of 3 inches near the flanges, which are left free to permit easy access to the screws. The space thus left is filled with felt. Pipes so covered have endured 13 years' exposure to weather without repairs. The method is cheap, easily applied, reliable, and it possesses the advantage of being very light.

AMERICAN SCREW CO.,

Providence, R. I.,

**MANUFACTURERS OF MORE THAN 4000 VARIETIES OF PRODUCT,
AND INCREASING THE ASSORTMENT DAILY.**

Machinery employed contains important inventions recently patented, and which are designed to produce Screws at a **lower cost to the consumer** than has ever been attained.

All goods are distributed through the Hardware trade, to whom a liberal discount will be allowed.

INTERNATIONAL EXHIBITION. PHILADELPHIA, 1876.

(No. 235.)

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons, and decreed an award in conformity therewith.

PHILADELPHIA, November 8, 1876.

REPORT ON AWARDS.

Product: Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz: **Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.**

G. L. REED, Signature of the Judge.

Approval of Group Judges.

Daniel Steinmetz,
Jas. Bain,
Chas. Staples,

G. L. Reed,
J. D. Imboden,

J. Diffenbach,
Dav. McHardy.

A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Awards.
Given by authority of the United States Centennial Commission.

A. T. GOSHORN, Director-General.

[L.S.] J. L. CAMPBELL, Secretary.

J. R. HAWLEY, President.



After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to style now adopted.

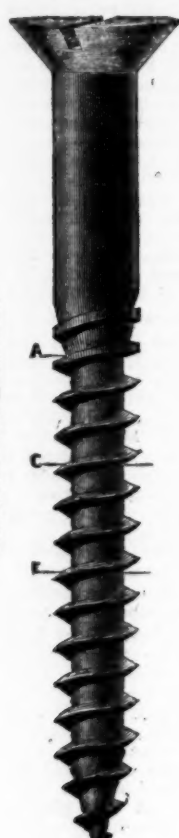
Experience has shown that the weak point of screws, as formerly made, is at the heel of the thread, where all

1776.



1846.

Patented August 30.



Section at Line A

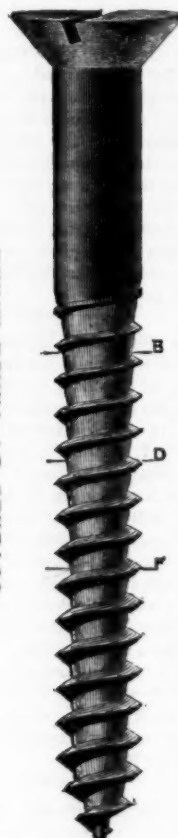
Section at Line C D

Section at Line E F

1876.

Patented May 30.

COVERED BY TRADE MARK.



Section at Line A B

Section at Line C D

Section at Line E F

Estimated to be FIFTY PER CENT. stronger than a Screw as Commonly made.

the strains of forcing the screw into the wood naturally concentrate.

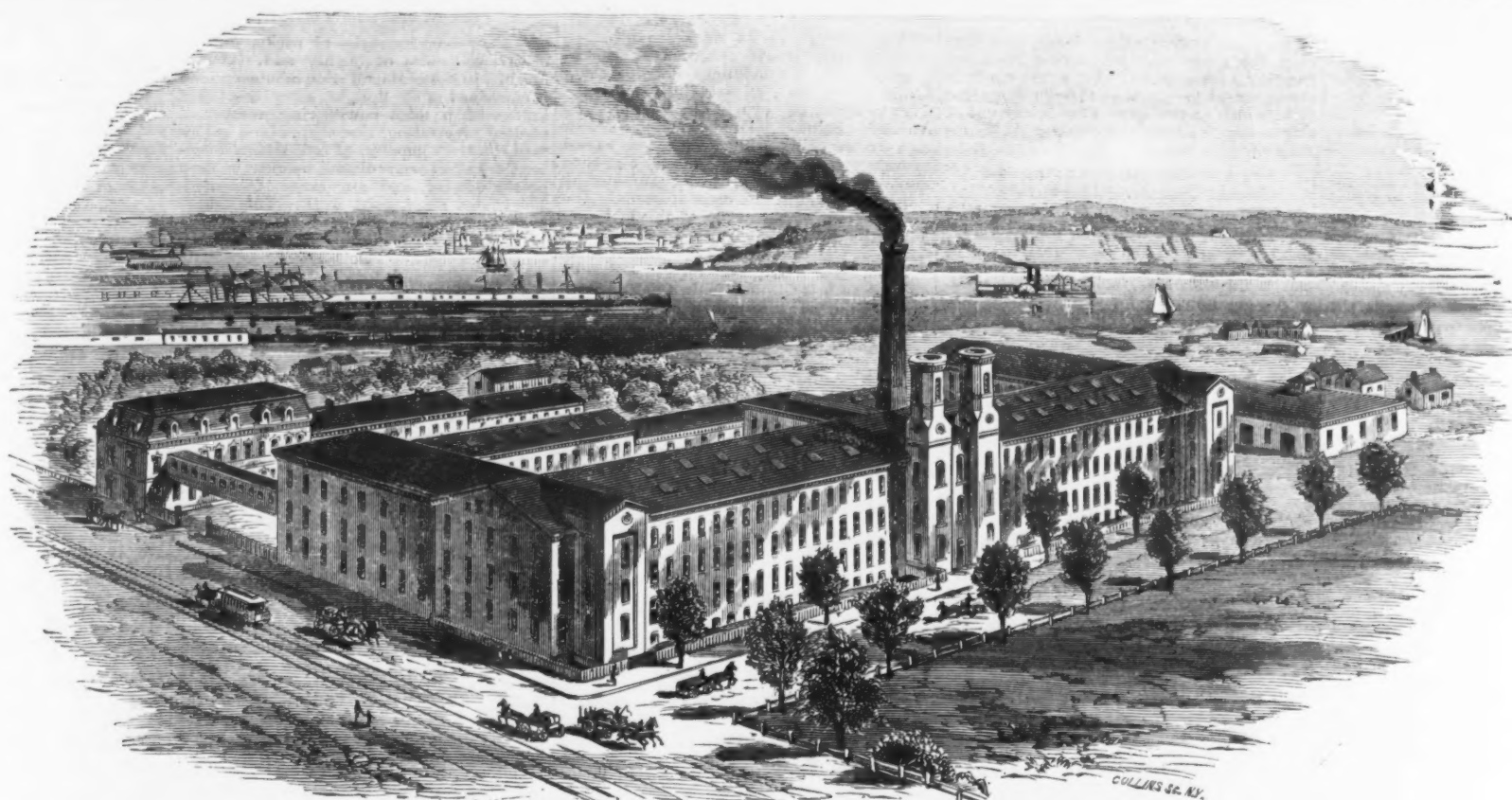
To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

CLAIM.

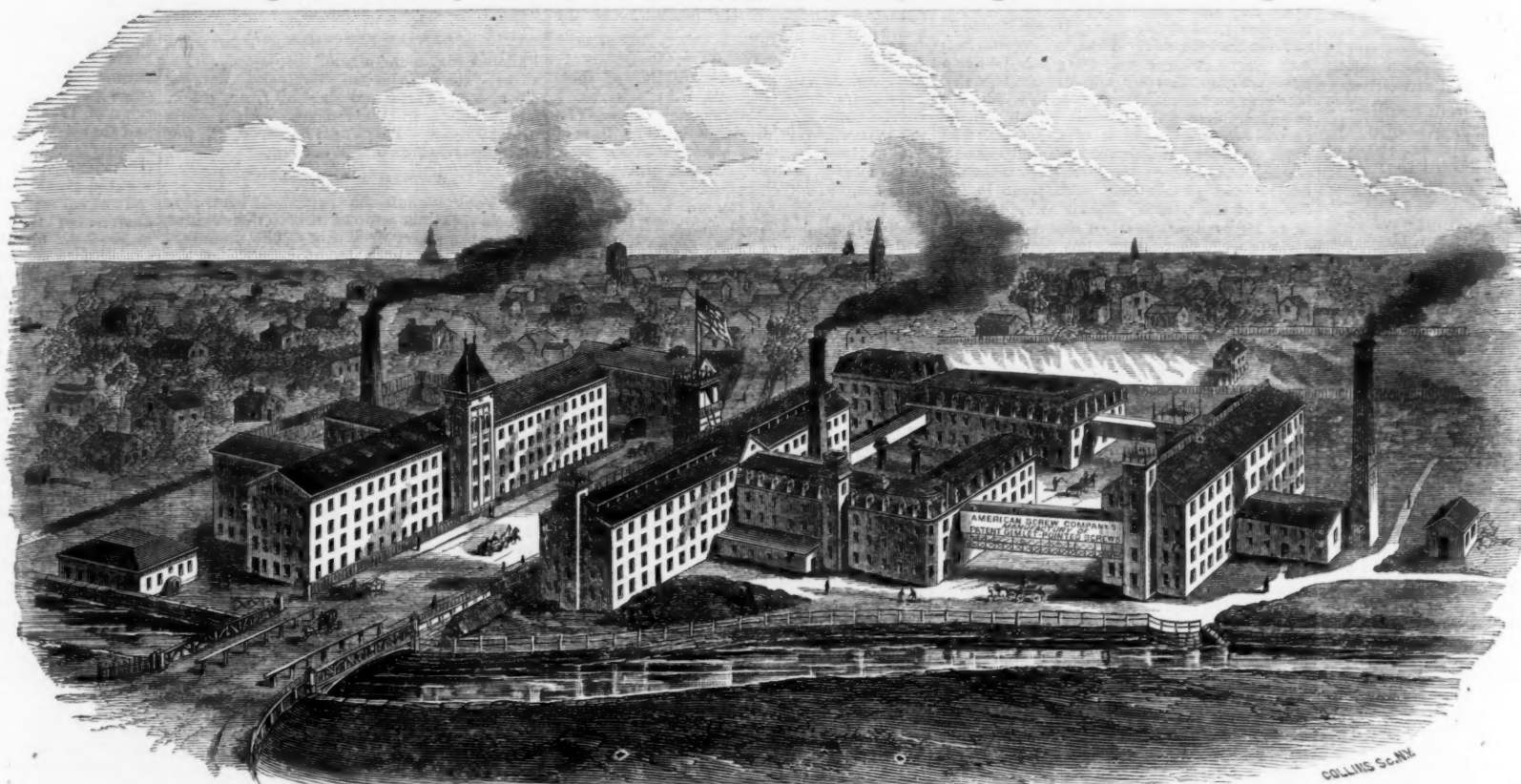
"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

On the opposite page will be found illustrations of the various Works of the company.



NEW ENGLAND MILL.

Containing Machinery for the Production of 22,500 gross of Screws per day.



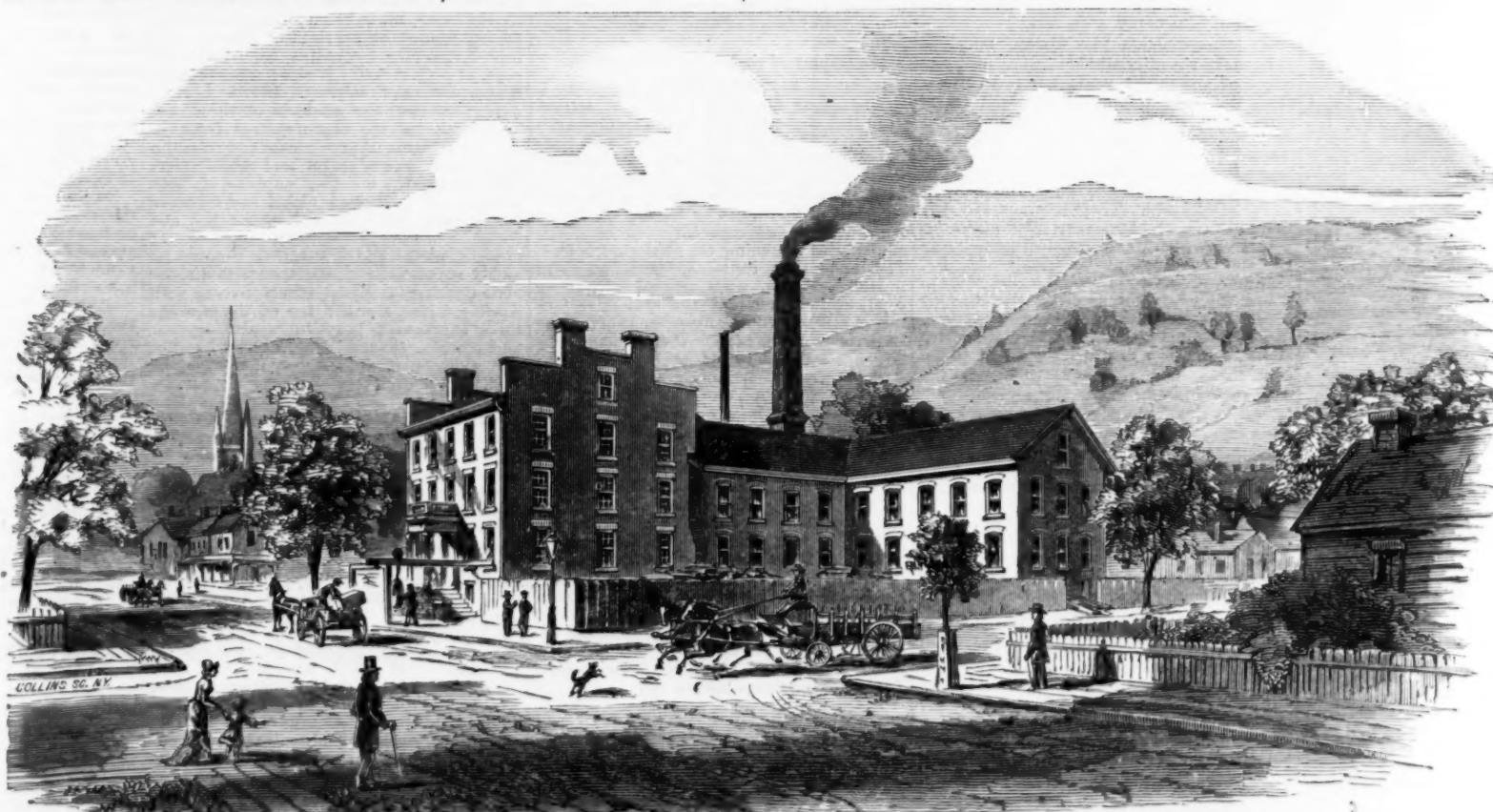
BAY STATE AND EAGLE MILLS.

BAY STATE MILL,

EAGLE MILLS.

For the Production of Stove Bolts, Tire Bolts, Rivets,
Lock and Machine Screws, &c.

Capacity 22,500 gross Wood Screws per day.



WORKS AT DUNDAS, ONTARIO, CANADA.

Capacity, 4000 gross Screws per day.

THE PARIS EXPOSITION.

American Exhibits.

(From our Special Correspondent at Paris).

MALLORY, WHEELER & CO.,

New Haven, Conn., make a display of locks which, in extent, variety, neatness and general excellence, fully maintain the reputation of this firm. The display includes every description of door and padlock in great variety of styles; ornamental bronze front mortise locks, with knobs to match; ornamental English bronze locks, both rim and mortise, with knobs to correspond; brass and iron front mortise rim locks, &c., Mallory, Wheeler & Co. are among the oldest and largest manufacturers of locks, knobs and escutcheons in America, having been in business 50 years and manufacturing these lines of goods exclusively. They were the first to manufacture unwrought iron padlocks in the United States. All the goods and the parts thereof which they exhibit, even to the mineral door knobs and malleable castings, were made in their own manufactory. A leading feature of the exhibit is in hotel locks, this firm having a large line, including rim and mortise locks with four tumblers, which are in sets of 140 or less, all different, with master key to pass the whole, and master key to differ in each set. The makers claim that these are the only locks made with a plurality of tumblers and so many changes, with safe master key to pass the whole set and key operating in same key-hole both sides of the door. They also exhibit a cheaper line of master keyed locks with less tumblers and changes, which makes their line of this class of goods very complete. Another special feature is their reversible door locks, reversing by simply pulling the latch bolt forward and turning it half way round. The mechanism is very simple, consisting of but two pieces, and does not seem liable to get out of order. Another very prominent feature is their display of padlocks, the line being large, including every variety of style and finish, and in keeping with other portions of the exhibit, which is large, interesting and attractive.

COLLINS & CO.,

of Hartford, Conn., and 212 Water street, New York, make an exhibit of edge tools of the lines manufactured by them that is, in some of its features, the best in the Exhibition. Though the exhibit is a small one, the taste displayed in its arrangement, the large variety of goods shown, but, above all, the wonderful polish of the articles in the case, attract constant attention. We could scarcely believe that the tools we saw were not plated, so very fine was the grain and so high the luster, but a careful examination convinced us that it was only the natural polish of the very fine grade of steel used by them in manufacturing. Though the exhibit is a small one, as we have said, types of nearly all the classes of tools manufactured by this firm are shown. Notwithstanding their very large list, this is accomplished by not duplicating samples. The variety of their markets is also indicated, and a large assortment of goods are shown suited to the wants of the tropics and southern hemisphere. Among the articles exhibited we notice a fine assortment of machetes and hunting knives, swords and tools for sugar, indigo and hemp culture. One part of the case is devoted to a display of American axes and edge tools made of solid steel, planters' hoes, shingling, claw and lathing hatchets, picks, broad axes and mattocks, screw wrenches, bayonets, sledges and mining tools, socket framing chisels, &c. In another group are axes and edge tools suited for South American trade. In the group of goods presented in finish common to the American market are the various patterns of axes, broad axes, and hatchets of all kinds. These goods are well finished, and are made of steel and iron in the usual way, and will compare favorably with any similar assortments that we have seen. As the practical utility of finishing goods for foreign markets has been questioned, it may be well to say in the first place that it is now conceded that any hold on foreign markets we have for our hardware and edge-tools does not come from their cheapness, but from their quality and finish; and in the second place we are informed that many axes and edge tools, especially sledges for both home and foreign markets, are supplied by this house, polished all over as shown, and purchasers pay the difference in cost, believing that surfaces so finished are a guarantee of the superior quality of the stock used in their manufacture. This is especially true of machetes, or Spanish knives, of which Messrs. Collins & Co. manufacture such an extensive variety, and of a great many other tools manufactured with special reference to the requirements of tropical markets.

The products of the works of

THE READING HARDWARE CO.,

of Reading, Pa., are displayed on two parallel-gram-shaped boards framed in walnut, leaning toward each other so that the tops meet and the bases are about a foot apart. These are contained in an upright show case. The ground of these boards is white, which sets off the exhibit to great advantage. The ends are of walnut fashioned in the "lock style" of a door, and fitted with locks in various styles, including some beautifully finished in bronze and nickel. One section of the parallel-gram shows all the grades of hardware used in a house, commencing at the front door and ending in the kitchen. It begins with the scraper at the door step, goes through the different patterns of knobs and hooks, ending with a fire-tongs, ladle and soap dish. The reverse contains a large exhibit of knobs, locks, hinges, pulleys and other classes of building hardware. Along the base of the case in which these are contained is an assortment of stationers' hardware in great variety, clips, files, weights and racks. Some of the bronze and nickel-plated hardware is noteworthy for the beauty of its design and the fineness of the work. The portion of their exhibit which attracts most attention, especially from the ladies visiting the exhibition, is their 1877 apple parer, which is out of the case and in a position to be shown. Its operation is very much admired. As attached to the table all

the gearing is above the apple, as well as the knife. This prevents the parings from clogging the gears and interfering with the working of the parer. By a very simple arrangement the apple is thrown from the fork, which at the same time is cleaned of any pieces of apple remaining. It seems very effective, simple and strong.

THE STANLEY RULE AND LEVEL CO.,

New Britain, Conn., make a display of their varied manufactures that is arranged with much taste and gives a good idea of the articles made by this well-known firm. The list includes a large assortment of ivory and boxwood rules, folding and straight, with a large number for special work, such as Gunter's slide and engineers' rules, caliper, saddlers', patternmakers', shrinkage, tailors', &c. We also noticed rules for other standards than English, there being a fine display of Metric, Danish and Spanish rules. In addition to rules they show plumbs and levels, adjustable plumbs and levels, try squares, bevels, gauges, spokeshaves, Bailey's patent iron and wood planes in great variety, plane irons, patent miter boxes, chisels, awl haftstake hammers, meat pounders, pinking irons, &c., all of which combine beauty of style and high finish. Among the various tools we notice Miller's patent combined plow, filletster and matching plane, which is a most ingenious and successful combination of the common carpenter's plow and adjustable filletster, and a perfect matching plane. The patent tonguing and grooving plane is another useful article, consisting of two separate tools, which are always used in connection with each other, and are here combined in one, thus affording two superior tools in a cheap form, and occupying no more room than one ordinary tonguing or grooving tool. The stock of this tool is made of metal, and it has two cutters fastened into the stock by thumb-screws. The guide or fence, when set, allows both of the cutters to act, and the cutters being placed at a suitable distance apart, a perfect tonguing plane is made. The guide or fence, which is hung on a pivot at its center, may be easily swung around, end for end. Thus, one of the cutters will be covered and the guide held in a new position, thereby converting the tool into a grooving plane. A groove will be cut to exactly match the tongue, which is made by the other adjustment of the tool. The guide or fence is hung for grooving boards planed from 1-inch stuff, and on these the tongue and groove will both come in the center of the board. Boards varying from 1/4 to 1 1/2 inch in thickness can be matched equally well, by working the planes so that the tongue and groove shall both come at their regular distance from one end of the boards to be matched, leaving the distance to the other edge to vary as it may. One extra width cutter accompanies the tool, to be used on the outer side of the tongue, in tonguing boards thicker than those planed from 1 inch stuff. The last article we shall notice is the patent improved miter box, the peculiar features of which are as follows: The frame is made of a single casting, and is subject to no change of position; being finished accurately at first, it must always remain true. The slot in the back of the frame through which the saw passes is only 1/4 of an inch wide, thereby obviating any liability to push short pieces of work through the slot when the saw is in motion. This miter box can be used with a back saw or a panel saw equally well. If a back saw is used, both links which connect the rollers or guides are left in the upper grooves, and the back of the saw is passed through under the links. If a panel saw is used, the link which connects the rollers on the back spindle is changed to the lower groove, and then the blade of the saw will be stiffly supported by both sets of rollers, and be made to serve as well as a back saw. By slightly raising or lowering the spindles, when necessary, the leaden rolls at the bottom may be adjusted to stop the saw at the proper depth, and by the use of a set-screw the spindles on which the guides revolve may be turned sufficiently to make the rollers bear firmly on the sides of a saw blade of any thickness. If a narrow saw blade is used, or if the saw blade becomes narrower from use, the rollers may be lowered on the spindles by removing some of the brass rings from under them.

M'CAFFREY & BROTHER,

of the Pennsylvania File Works, Philadelphia, make a very creditable display of hand cut files and rasps made from American steel, and fully warranted by them to be equal to any similar goods of either foreign or domestic manufacture. The exhibit is intended more to indicate the quality of their manufactures and the sizes and styles of files made by this house than to make an attractive display. They have not failed in the latter respect, however. The variety of files is very great, and includes nearly every size and style known to the trade—i. e., flat, round, oval, half-round and the various cuts. Some valve-bit files seem to be of very superior workmanship. The cut of all these files is even and clean, and the teeth sharp and strong. The display is a credit to the firm.

THE COLEMAN EAGLE BOLT WORKS

(Weiss & Lea), Philadelphia, make a small but very complete and interesting exhibit of carriages and tire bolts. A single bolt is not in itself a thing of beauty, but the taste shown in arranging this exhibit makes it a most attractive display. A large variety of sizes and styles are grouped to form circles, curves, &c. The bolts appear to be very smooth and uniform, and well finished. The material used is the best Swedish or Norway iron, the quality of which is shown by bends, twists, curves, &c. Some of the shapes into which they have been twisted and bent, cold, severely test the iron of which they are made. A bolt apparently some 12 inches long is bent into a volute of five circles without even cracking the thread of the screw. Other bolts are formed into letters, the words carriage and tire bolts, 1845, 1878, being formed in this way.

HOOPES & TOWNSEND,

of Philadelphia, is for the most part a duplicate of their display at Philadelphia. The same neat and tasteful pavilion of polished walnut contains the exhibit, which consists of an almost endless variety of bolts, nuts, washers and kindred goods. The floor space

is 300 square feet, and the height of the pavilion 18 feet. To its sides are attached bolts and nuts; irons for railroad car trucks; forgings, &c., for buildings, flat link chain for elevators, &c., all artistically arranged so as to strike the eye in the most pleasing manner. Below these and reaching the floor is a series of bins filled with the varied manufactures of this firm, in order that they may be handled and critically examined by those interested in this class of goods. The design of one of the walls of this inclosure is worthy of special mention. The initial letters of the thirteen original States form an arch. These letters are formed with bolts and the arch is outlined with a flat link elevator chain. The keystone of the arch is formed of boiler rivets. The keystone is the copyrighted trade-mark adopted for these rivets, and the whole forms a design at once appropriate and effective. The display of rivets is very large, including cone head, button head, countersunk button head, countersunk flat head, &c., from No. 10 to 1 1/2 inch. They also show taps and dies, car irons, belt bolts, railroad track bolts and bolts, in the following varieties: square head, hexagon head, button head, button head square countersunk, button head square under, blank bolts, bolt ends, &c., rods for roofs and bridges, and swivels for 1/4 to 3 1/2 inch rods, pipe swivels, building irons, wood screws, set screws, patch bolts, elevator chains, forged nuts, cold-pressed nuts, both square and hexagon, from 1/4 to 2 inch. On a table in the pavilion bars and sections of bars are exhibited, showing some wonderful examples of cold punching, and also illustrating the phenomena of the flow of metals as exhibited by bars and nuts when punched cold. The bars are 1 1/2-16 inch thick and the punch used 7/8 inch in diameter. We have illustrated these phenomena so lately (page 3, April 18) that we need not enter into detail at this time. It may be well to say, however, that contrary to the general opinion the process of punching thick bars does not depend for its successful performance upon the time taken, but upon the accuracy and power of the machine and the quality of the punch.

LEONARD BAILEY & CO.,

Hartford, Conn., exhibit a full line of their mechanic's tools, including try squares, I bevels, patent adjustable bench planes, Victor planes, spoke shaves, &c. The line of Victor planes includes block, smooth, jack, fore, jointer, rabbet circular and a plow, filletster, back filletster, dado, rabbet, plane and matching plane combined. Some part of nearly all the tools exhibited is plated, and the exhibit is, as a whole, a very attractive one. One of its noticeable features is the fact that no wood is used in the construction of a single article except in the handle of the patent reversible spoke shave. The display is creditable, and attracts much attention from visitors familiar with such tools and their uses.

The exhibit of THE DOUGLAS AX MANUFACTURING COMPANY, of Boston, Mass., is one of the most conspicuous features of the American section. It is contained in an upright case of monster dimensions, the front being 25 feet square, we should judge, composed of six very large panes of glass with only a narrow edge of wood at the top, sides and bottom. The back of the case is of black cloth, the dark ground contrasting sharply with the brightness of the polished tools. On this ground the manufactures of the firm are arranged in a very ingenious manner. Around the outer edge of the display board, as a border, is a row of axes. The corners at the top are rounded and a rosette of axes and sledges formed in the angle. A second row, composed of hatchets, is placed inside this. The poll of these axes and hatchets is painted black and the edge is polished. This forms a frame for the exhibit, inside of which every description of tools manufactured by this firm is shown—axes, adzes, hatchets, mattocks, picks. These are grouped in various set figures such as stars, diamonds, circles, &c. The effect is very striking. In the center of a large star, which is also the center of the exhibit, by way of contrast, an ax of 1826 (never used) is placed. It seems very much out of place among the new goods, but it serves to show the great advance that has been made in the manufacture of axes in the last half century.

The display of skates by

BARNEY & BERRY,

of Springfield, Mass., is a constant attraction and the subject of much enthusiastic comment, especially from visitors and commissioners from northern countries, such as Russia, Sweden and Norway. They are not only attracted by the beauty of the form and style of finish, but by the fine quality of the material, and especially the ingenious methods of fastening the skate to the foot. The exhibit is contained in a beautiful pyramidal case, with crossed skates as crests on the gables of the four sides. In this case is a complete assortment of all the styles of skates made by them, though the larger number are of their well-known "Club" and "Ice King" patterns. The sizes are from a pair that Tom Thumb might use to one large enough for the famed seven-league boots of Jack the Giant Killer. In the "All Clamp" skate the hind plates, foot plates and brackets are made from crucible cast steel; it also has a double screw on the clamp. The display of their "Ice King" skates is very fine. The blades are polished and ornamented in gold, silver and nickel, and are engraved and etched in beautiful patterns. The design, style and finish, and the simplicity of construction of this skate are worthy of all praise. Every part can be removed, cleaned, oiled and replaced without the use of a tool. They are made of the best steel, and tempered by Barney & Berry's patent process.

C. S. OSBORNE & CO.,

Newark, N. J., make a very fine display of saddlers' and harness makers' tools. The finish of the tools is excellent, and the variety seems such as to cover the entire line of goods of this class. Most of the tools have rosewood handles, and the firm state that they are made of the best steel, with the greatest care, and each piece is thoroughly inspected before leaving the factory. The only display of American cutlery at the Exposition is that of

THE NORTHFIELD KNIFE CO.,

who show over 800 styles of pocket cutlery of various grades of quality and styles of finish. In the center of the exhibit, which is contained in an upright show case, is a knife with a most bewildering number of blades, illustrating the shapes and styles made by the company. From this as a center the knives are radiated, making a very pretty display, and are easily inspected. The blades show good work. The shapes are graceful and well fitted for their particular uses. The forging is good and the finish excellent. The handles, especially some in ivory and tortoise shell, are very neat. The display is a very creditable one, not only to the firm, but as a sample of American cutlery.

An attractive feature of the exhibit of

THE OHIO TOOL CO.,

of Columbus, Ohio, is the handsome line of wood stock carpenters' planes and plow planes, in rosewood with ivory trimmings. They also show matching and smooth planes in wood; jack and jointer planes in iron; bench screws and clamps; socket, firmer and framing chisels. In fact, a general line of the tools manufactured by them.

JOHN L. TOWER,

New York, shows in the main aisle a handsome line of iron bench planes, with handles finished in nickel and gold, giving them a very showy appearance. He also exhibits Boardman's combination wrenches, six tools in one, in a great variety of sizes. These goods are shown in gold and silver plate and highly polished steel finish. Besides the above we noticed a handsome assortment of Brown's patent padlocks in iron and brass, Pye's patent padlocks in the same finish, Scandinavian or jail locks in great variety, and a large line of police goods, including police revolvers, patent handcuffs and leg irons, police nippers, and a flexible police club of leather and whalebone; all extra finished goods, and attracting by their beauty the attention of even those who are but little interested in the goods themselves.

EDWARD SAMUELS & CO.,

Philadelphia, make a small display of picks, adzes, sledges, stone hammers, harrow teeth, &c. The samples are all from stock, and neither made nor finished with a view to exhibition. They are, however, all the more interesting on this account.

TATHAM & BROTHERS,

New York, manufacturers of sheet lead, pipe and shot, exhibit samples of both their chilled shot and ordinary drop shot. The manufacture of chilled shot, a superior article on account of its greater hardness, has been very successfully introduced into this country within the last few years. The samples exhibited by the firm embrace all regular sizes from fine dust to B B B, which is the largest they make. They are displayed in a series of bottles in a case. The 19 sizes of drop shot are well arranged in a large glass shot tower some 8 feet high, the interior of which is arranged in compartments about 5 inches high filled with the shot. On sample cards shown, the shot of various sizes is so arranged as to prove how extremely accurate and uniform the size of the shot is and how true is its spherical shape, points of superiority upon which American manufacturers justly pride themselves.

JOSEPH WHARTON,

Philadelphia, makes a very interesting exhibit of nickel and cobalt ores from the celebrated Gap mines, in Lancaster county, Pa., together with their products. The exhibit is contained in an upright desk show case. In the desk part is shown ordinary nickel ore and Millerite, with some samples of copper pyrites and nickel matte. The Gap mines, from which these specimens were taken, were worked for copper as early as 1744, and at intervals to 1852. In this year the superintendent of the mines discovered that what was termed "mundic" and thrown away as useless, was not mundic but some other mineral. In 1853 Prof. Genth analyzed it and determined it to be nickel. In 1862 Mr. Joseph Wharton took possession of the mines, and at the same time purchased works at Camden, N. J., for refining and manufacturing. So far as known, there are no other mines so productive as these, the concern mining and smelting 600 tons of ore per month. The ore it leaves the mines contains from 1 to 3 per cent. of pure nickel. It also contains cobalt, copper, iron and sulphur. In the upright part of the case the products of these ores are shown and the manufactures from the same, consisting of pure nickel and cobalt in cubes and grains, nickel and cobalt oxide, sulphate and ammonia, sulphate of both metals and pure cast nickel and cobalt in plates, bars and rods, and also rolled and wrought. Two horse-shoe magnets of wrought nickel and a magnetic compass of nickel are also shown, together with articles plated with nickel and others colored with cobalt oxides. On the top of the case are three clusters of beautiful vitriol crystals under glass shades. The exhibit is not only a very fine one, but very interesting as well.

Railway Material for New Zealand.

The bark Helen Anjier is now receiving on board a shipment of railway material for the New South Wales Railway Company, comprising seven 54-foot turn-tables. American locomotives and railroad supplies of all kinds appear to be in favor in that part of the world, notwithstanding the English manufacturers have always had things their own way out there. This consignment, it is believed, will be followed by others more important.

St. Louis is energetically pushing her direct trade with South America, and, as is announced by one of her business organs, has come to the conclusion that she can displace with the middlemen of the East in sending her choicest flour under home brands to Brazil. A recent shipment of 1200 barrels to that country netted the shippers \$1 per barrel, and prominent millers are busily at work in organizing the extension of the trade. Four thousand barrels were to have been shipped on the 6th, on board John Roach's steamer, for the Brazilian market—a movement which has led Baltimore to make extra exertion to hold her own there.

The Currency of China.

Mr. George F. Seward sends to the State Department the following very interesting report on the currency of China, the methods of assaying and minting employed in that country, &c.:

It is well known that the Chinese government does not issue coins of silver or gold, and that the pieces called by them "ch'ien," by the English "cash," and the French "sapecu," from the Portuguese "sapecu," which are made of copper variously alloyed, are the only ones in use among them. They are circular and have square holes at the center which are used for stringing them together. They are cast and not minted.

The places and mode of casting cash are regulated by imperial statutes. Models are given out by the Board of Revenue at Peking. The standard weight is one mace (ch'ien) each, and the value, by government standard, is the one-thousandth part of a tael of silver of the Treasury scale. (Staunton's Penal Code, sec. 118.) The casting of cash is under the control of the provincial governors, subject to the orders of the Board of Revenue, and theoretically care is taken that the issues shall be so managed that the supply shall be sufficient to meet the demands of the people, and not so great as to cause their depreciation relatively to silver.

A coin, if it can be called such, which is cast and not minted, will, as a matter of course, be counterfeited. One made of a metal so base as copper, with alloys of a still baser sort, will be peculiarly liable to be counterfeited on the one hand and debased on the other. In this connection, the following remarks, taken from the Commercial Guide of Dr. Williams, will be found pertinent:

"Within the last few years the government have taken strong measures to suppress the private manufacture of cash, but in vain. The capacity of the governors is strongly exemplified in its gross adulteration since the time of Kianghsi, about 150 years ago. It is debased in the coarsest manner with iron dust and sand, and presents a gritty appearance to the eye. In the reign of Taokwang (1821-51) it became so bad that it would not remunerate forgers to counterfeit it. In the reign of Hsienfung (1851-61) iron cash and paper notes were substituted for the copper cash."

The currency of Peking gives special evidence of the irregularities which have marked its history. By a curious fiction every piece of cash is called two. Without being able to trace out the cause of this, I have supposed that when the cash in use at a given period had been debased in value about one-half, an effort was made to correct matters by issuing coin of standard merit, and ordering that each piece of the new issue should be taken as equal to two pieces of the old. The new issue in time became debased and confused with the old, until there was no recourse for the people but to call one cash two, irrespective of the issue.

Still later copper tokens of ten, twenty, &c., were issued, and these are now in circulation. They were never, however, of standard value. In 1869 one ten cash piece was worth about three of the single cash pieces of varying issues which were in circulation, and 525 of them were required to purchase a tael of silver. As each piece represented ten cash, and as every piece of cash was doubled by the custom already referred to, 10,500 nominal cash were equal to a tael. Their value has decreased relatively to silver since then, and at times 18,000 nominal cash are required to purchase a tael. The paper tiao of the city represents 1000 nominal cash, while in theory a tiao, or string of cash, should be equal to a tael.

In 1853-54 an effort was made to force the iron cash spoken of above upon the people of the city, but it signally failed. "It was thrown away about the walls and byways, no one even thinking it worth the trouble of picking up."

It would seem, indeed, that the capital city and the north of China generally have suffered more from irregular practices affecting the currency than the more southern districts. It is said that many iron cash are in circulation in Chihli, Shansi and Shensi, and that an effort has been made in each considerable town to preserve a standard of value by counting more or less of the actual cash as equal to a tiao, so that the custom of the place might be known before the person who has bought articles to any given value can tell how many actual pieces of money he is to pay for them.

At the ports open to foreign trade and in the southern provinces generally, the actual cash are counted and so passed for the purposes of a currency, but their intrinsic value varies, not only as between the ports, but at the several ports. From statements made by the Consuls of the United States to the Legation in the year 1873, I have derived the following results as to the value of the average cash of each port relatively to the Haikwan or customs tael.

At Newchang.....	1 tael = cash 1,000
" Shanghai.....	" " " 1,800
" Chinkiang.....	" " " 1,950
" Ningpo.....	" " " 1,668
" Foochow.....	" " " 1,705
" Amoy.....	" " " 1,730
" Swatow.....	" " " 1,668

Assuming these figures to be approximate, a range of relative values amounting to nearly twenty per cent. is shown.

Mr. Kingsmill, writing at Shanghai about ten years ago, said:

"Taking carefully picked cash, coined before 1820, such as are known in the market as Hankow picked, the average weight is rather less than 1.00 ch'ien. Slightly below this is what is known as Chinkiang cash, weighing from .940 to .943. Far below either is the ordinary currency in Shanghai. Taking a sample rather above than below what is known as fair quality, we will probably find it composed as follows:

Fair to good (in numbers).....	500
Japanese and foreign.....	200
Debased of last two emperors.....	300
	1,000

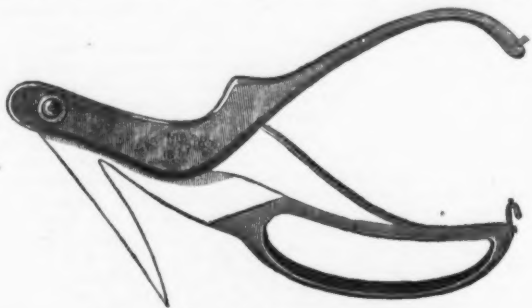
The average weight is about 730 ch'ien only. The same writer shows that at Hankow, under circumstances which created special

Chadbourne's Patent Wire Band Cutter.

The accompanying illustration presents a very useful implement for cutting wire bands such as is used for binding grain, &c. Its operation is very simple, the wire band being drawn by the hook within the cutting blades of the shears, and by a gentle pressure of the hand the band is severed with but little effort, while the spring between the handles readily opens the blades. Hermann Boker & Co., Nos. 101 and 103 Duane street, are sole manufacturers of this cutter.

The Brewster Roasting Furnace.

As mining reaches greater depths the nature of the ores undergoes a chemical change. Native metals, carbonates, sulphates, oxides and chlorides, the products of surface disintegration are displaced by sulphurets and arsenic and antimony compounds. The latter it has been impossible to reduce by the simple processes of extraction adapted to less refractory ores, and thus it has been necessary to adopt more complicated methods to extract the precious metals. The only means found successful until now have been either preliminary ordinary roasting or chlorinizing, or both. The demand for an improved furnace capable of doing the necessary roasting efficiently, cheaply and with a minimum expense for labor and fuel has, in this country, produced a number of furnace types of striking originality, notably the earlier Stetefeldt and the later Bruckner furnaces. To these we can now add the Brewster, which is quite different in principle from the two just named. It is circular in shape, and has the advantage of working entirely automatically. In the original ordinary reverberatory roasting furnaces,



CHADBOURNE'S PATENT WIRE BAND CUTTER.

with two and three terraced hearths, the necessity of ridding the powdered ore incessantly by hand labor is a source of heavy expense in labor and time. The production is small, and the completeness of the roasting depends in a great degree upon the good will of the workman. Notwithstanding these disadvantages, the long reverberatory furnace has not been entirely abandoned, a fact which tends to indicate that present appliances do not quite meet the demand in all cases.

The Brewster furnace has a flat circular hearth, 12 feet in diameter, consisting of an iron shell filled with 5 inches of fire-clay. Its circumference is fitted with teeth and driven by a gear wheel, by which a rotary movement is given to the hearth. It rolls on a number of balls with but little friction. Through the center of this hearth rises the main air pipe through which the air for the combustion of the sulphur enters. Passing downward through an annular space the air enters four wrought-iron tubes, 6 inches in diameter. From each of these main branches 17 small pipes reach downward into the ore spread out on the hearth. The air coming from them strikes the glowing ore, and as it has been heated during its passage through the pipes, the combustion of the sulphur in the ore is very rapid and complete. The ore is automatically dropped into the center of the hearth by a charging-screw working in a funnel. As it passes under the pipe-rake it is thoroughly riddled and provided with the necessary air for combustion. The pipes of the rake, as they have a slanting position, gradually push the ore toward the circumference until it drops into a gutter, from which it is removed by a number of scrapers attached to the circumference of the hearth. Thus the ore is submitted to incessant ridding, while at the same time hot air is carried to it and mixed with it. The fact that the air passes through the rake protects it from rapid corrosion. The furnace is heated by a grate 4½ feet square, the flame being equally distributed over its surface by a judicious placing of the flues around the circumference of the furnace. The furnace is supplied with air by a No. 1 Root blower. The capacity of the Brewster furnace necessarily varies with the nature of the ore, the percentage of sulphur, &c. A series of experimental trials is now being made in this city with North Carolina gold ore containing considerable amounts of pyrites. Judging from the red appearance of the roasted ore the pyrites is thoroughly converted into oxide of iron. The crucial test must, of course, be furnished by assay and chemical analysis, the results of which we shall be able to lay before our readers in another week.

The motive power for the furnace now working is a 10-horse-power Baxter engine. With rich ores it would seem advisable to place a dust chamber between the furnace and the chimney, as in such cases the amount of ore carried off by the current of furnace gases and blast would prove a valuable item.

The fact that a roasting furnace used in the Rhemish provinces for desulphurizing cupriferos quartz, which embodies the chief principles of Brewster's construction (although its details do not seem so well adapted to its work as those of the latter) has proved very efficient, gives promise of its success here. Those interested in this furnace, which promises to acquire great importance, especially for the complex ores of Colorado and the sulphurets of our Southern States, may see the furnace working in this city on the 16th and 17th inst. by applying to the Brewster Reduction Company, No. 1 Park Place.

Says the San Francisco *Atta*: One of our leading manufacturers incidentally re-

marked to one of his workmen that if the Kearney ticket should succeed he did not expect to be able to provide work for himself or for his workmen. At the Reisen Keller, last night, a stranger approached the manufacturer and said: Owners of frame houses should be careful how they talk of discharging workmen. Wood burns easily.

Foreign Work Ready for American Bidders.

The Philadelphia *Review* says: Encouraging reports are received constantly of the efforts made by Philadelphia to open up the Mediterranean coast to American trade. A gentleman of commercial prominence in Russia gives as his opinion that when the present warlike cloud has passed away American manufactures will begin to make serious headway in the Russian markets. Another correspondent believes that the Americans might enter into successful competition with the German, French and English dealers who now control the Italian market, while natives of other countries suggest that much good might result from a distribution over the Continent of catalogues of American goods, printed in the language of the various countries proposed to be covered.

Several large contracts are now open in different parts of the world to which our American capitalists, if they take time by the forelock, might turn their attention with profit both to themselves, their workmen and the country at large. On the Continent the Lisbon and Entrocamento Railway is about to place an order for nearly 20,000 tons of steel rails. The company can be addressed at Lisbon. In Italy two railroad enterprises are under consideration;

one for the construction of a line from Afraso to Saluzzo and Coni, and the other from the latter place to Mondovi, both in Piedmont. For information the Italian Minister of Transportation can be addressed.

In Spain the Cortes is considering the desirability of constructing a line from Molina to Caldas de Mounbuy, and the government also proposes to construct a line from Pontevreda to Redondela, to connect with the road from Tuy to Vigo. The national government is being urged also to construct a branch line from Puente de los Fierros to Pola de Lena, and another from Busdonjo to the tunnel of Arbas. In London, also, the Southeastern Railway Company is about to place an order for a number of goods, engines and bogie carriages.

Opportunities to bid for contracts are rife in Mexico. A bridge is to be constructed over the river Lerma, as a step toward developing trade between the states of Michoacan and Guanajuato. A railway is to be built between Puebla and Izucar de Matamoros. A rolling mill for railroad iron is to be started at Morelia, and a paper and cotton mill at San Miguel de Allende. The state government of Tamaulipas has been authorized to construct a railway and telegraph from Tantoyuquita, or some other point on the Tamesi river, to the city of Valle del Maiz on the boundary between the states of San Luis Potosi and Tamaulipas.

Other opportunities present themselves in still more distant parts of the world. In Bolivia the Executive has been authorized to construct a railroad from Salinas to Caracoles. In Yucatan, Central America, another line is to be constructed between Merida and Peto. In Western Australia a light cable is wanted between Fremantle and Rotne island, while the Queensland government desires one from the north of Queensland to Singapore. The Messrs. Siemens Brothers, of Germany, have made a bid of \$3,500,000 for this latter contract, but the offer has been officially declined. The merchants of New South Wales are also bestirring themselves to obtain a duplicate cable to Europe. Several routes have been suggested, including one from the Northwest cape to San Francisco. This would cost about \$10,000,000. Any company which would take the matter up is guaranteed an annual subsidy of \$375,000 by the New South Wales government.

Compressing Artificial Fuel.

Mr. Thos. Grant, of Cardiff, Wales, has a process for molding the material into blocks which possesses considerable interest: After the material has been treated by any of the known methods, he runs it into a hopper at the top of the machine. Beneath this hopper he places one or more horizontal tables, which by preference he makes of a circular form. These tables have in them molds of the desired form, arranged at equal distances apart. Each mold has inside a plunger or piston, and on the face of each plunger or piston is any suitable design, mark, or lettering for the purpose of marking or stamping the block of fuel or other substance. The tables have cogs or teeth arranged all around their external circumference or rim (as in the case of a spur wheel), in order that they may be driven by a toothed pinion placed on a shaft for that purpose. Where more than one table is used, each may be driven by a separate pinion, or one pinion can be placed to drive one table, and the teeth or cogs on the said table made to gear in teeth or cogs of the other tables, and this latter arrangement he prefers to adopt.

The material is fed into the molds through a hopper, and as the tables revolve on their axes by the action of the toothed pinion or

pinions, the molds pass in succession under the hopper to be filled in regular rotation, and on leaving the hopper after being filled, they pass between a pressing cylinder having a ram or piston, or a level and pressing cylinder having a ram or piston and a resistance piece, the resistance piece and cylinder being bolted together by means of two or more bolts or columns.

As each table has its own pressing gear, one bolt or column of each cylinder also acts as a carrier for one of the tables, so that the center of the pressing ram shall have the same radius as the centers of the molds, the two pressing arrangements being joined by a connecting rod. Immediately the center of the mold is over or under, (preferably the former), the ram or lever as the case may be the said ram or lever rises by the opening of the valve which lets the pressure into the cylinder, thereby giving the block the necessary pressing, and by its own force squeezing the block against the resistance piece with such force that the cylinder and resistance piece, with their attachments already described, are carried around with the table a certain distance, pulling back with them the cylinder and attachments that are on the other table, bringing it into position to press a block. When the exhaust valve opens and lets the pressure off the first cylinder, another valve opens and allows the pressure to go into the second cylinder, which in its turn makes part of a revolution with the table, bringing back with it the first cylinder and attachments into position for pressing, and so on, as long as the machine is in motion, the pressing being let in and out of the cylinders alternately by means of a slide valve or other suitable valve or contrivance. The pressing power may be water, steam, compressed air, gas, or other power capable of effecting the required object. The block after being pressed is delivered by means of an incline, up which the pistons or plungers travel, actuated by arms and levers attached to the cylinders. An arrangement may also be attached to the cylinders from the driving shaft, to move the cylinders backward and forward in case anything should happen to the rams or pistons and prevent them from rising at the right moment. The blocks may also be pressed by means of an incline and resistance pieces only, the resistance pieces being connected together by means of a rod. In this case the center columns, upon which the table revolves, will pass through the resistance piece as in the other arrangement, the other columns being dispensed with, the outside edge of the resistance piece having lugs passing under the bottom side of the table to prevent it lifting as the pressure increases. The resistance pieces are in this case moved backward and forward by means of a connecting rod from the driving shaft.

A Tack Factory Burned.—Fire caught in the engine room of the Taunton Tack Company's building at 11 o'clock Monday morning. A portion of the buildings of the company were saved, but in a damaged condition. The excessively hot weather made a tinder-box of the wooden structure, and gave the flames full sweep. The loss is estimated at \$75,000; insurance, \$60,000.

Special Notices.

OFFICE OF

The Table Cutlery Manufacturers' ASSOCIATION

OF THE UNITED STATES,

Comprising Beaver Falls Cutlery Co., Landers, Frary & Clark, John Russell Cutlery Co., Meriden Cutlery Co., Lamson & Goodnow Mfg. Co., American Cutlery Co.

TO THE TRADE.

This Association will offer for sale, WITHOUT RESERVE, through

Messrs. BISSELL & WELLES, Auctioneers,

At 83 Chambers St., New York,

Their entire stock of Discarded Patterns, which will include all goods not regularly classified and priced by the Association, to which the attention of buyers is solicited. All goods offered will be of first quality. All purchases made at this sale will be allowed to apply on quantity for season ending December 31, 1878, but will not be subject to rebate or cash discount. By order of the Association.

R. N. OAKMAN, JR.,
C. S. LANDERS,
B. B. YALE,
H. A. CURTIS,
Exec. Committee.

NEW YORK, July 5th, 1878.

GENTLEMEN: Referring to the above circular of the Cutlery Association, we hereby announce to the Trade that we will offer at auction at our new salesroom,
No. 83 Chambers and 65 Reade Streets,
(Lately occupied by Messrs. Walsh, Coulter & Flagler)

On Wednesday and Thursday, July 24th and 25th, At 10 o'clock, A. M., for Cash, over \$75,000 worth of first quality Table Cutlery, Carvers, Butcher Knives, &c. The sale will be PEREMPTORY, and will comprise large invoices from each member of the Association, consisting in part of about 6000 gross Table Cutlery, 6000 pairs Carvers, 1500 dozen Butcher Knives, &c. The sale will be made in quantities to suit large and small buyers, and the well-known character of the manufacturers will be sufficient guarantee of the quality. The variety of patterns and styles will be much more desirable than those offered at the last sale of the Association, as the present offering will consist of STANDARD GOODS, ALL MADE WITHIN THE PAST YEAR, and will be such as to meet the demand of the Trade of all sections. This sale will be in every respect worthy of your attendance. Catalogues will be ready on Monday, July 15th, and will be furnished on application.

BISSELL & WELLES, Auctioneers,
83 Chambers and 65 Reade Streets.

SPECIAL NOTICE.

The undersigned offer their services as agents to American Producers of Metals. They represent foreign brands of
Zinc, Russia Iron, Hoop Iron, Window Glass, Cutlery and Guns.

LOUIS WINDMULLER & ROELKER,
30 Reade Street, N. Y.

BOOKKEEPER AND ACCOUNTANT.

An expert Bookkeeper and Accountant, of long experience in iron works and mine offices, desires an engagement. Is perfectly familiar with every detail of the business, and understands keeping accounts, records of working, cost of product, &c. Best references in this country and England. A good position will be taken at a moderate salary. No pretence as to location. Address, J. M. H., Office of The Iron Age, 83 Reade St., N. Y.

Special Notices.

JENNINGS'S COMBINATION DISCOUNT TABLES.

(Published by the author.)

This Book contains 1500 tables for single and combination discounts, such as 17½%, 45%, 100%, 7½%, 150%, 25%, 33½%, 50%, 350%, 75%, 450%, 50%, 600%, 100%, 650%, 100%, 650%, 100%, 750%, 100%, &c., &c., which are so arranged as to be found without loss of time, and by their use either the Discount or Net on any amount of dollars and cents, from a penny to one million dollars, can be ascertained in a few seconds entirely by Addition. Just the thing for making or proving invoices, finding Net Value of goods bought or sold, and comparing different Discounts, thereby saving time, blunders and Headwork.

(A copy can be examined in "The Iron Age" Exhibit at the Paris Exposition.)

OPINIONS.

NEW ALBANY, IND., April 25, 1878.
Mr. S. H. Jennings: DEAR SIR.—Please let us know if we can procure "Jennings's Combination Discount Tables" in any city near here. We wish to examine a great saving of time and labor, and I take pleasure in recommending them to others.

Yours truly,
TERSTEGGE, GOHMANN & CO.,
National Store Works.

NEW ALBANY, IND., April 30, 1878.
Mr. S. H. Jennings: DEAR SIR.—Your Book received by mail. We like the Tables very much. Enclosed find three dollars. Please acknowledge receipt.

Yours truly,
TERSTEGGE, GOHMANN & CO.

NICHOLS, TIOGA CO., N. Y., May 3, 1878.
I am very much pleased with the Tables. They are a great saving of time and labor, and I take pleasure in recommending them to others.

ALEXANDER A. SWINTON.

ROCKFORD, ILL., May 20, 1878.
We use the Tables in making out invoices and find them accurate and useful, and would recommend them to parties who have many discounts to make, and who wish to find the same quickly.

ROCKFORD BOLT WORKS.

It will be mailed, postpaid, to any address, on receipt of the price, \$2. Currency may be sent by mail at my risk. Address

S. H. JENNINGS,
Deep River, Conn.

S. H. JENNINGS, Deep River, Conn., U. S. A.,

Offers his services to parties in any FOREIGN COUNTRY except Great Britain, who may desire to establish, build up, or increase a trade in American Hardware, Agricultural Implements, Machinery, and Miscellaneous Goods, as EXPORT FACTOR,

at a low rate of commission. Correspondence solicited. He has had three years' experience as Purchasing Agent for

Messrs. W. M. MARPLES & SONS,

Sheffield and London, England,

Jobbers doing business throughout Great Britain, and to whom he would with pleasure refer. By arrangement with them he will represent no other firm having a house or branch house in Great Britain, which includes England, Ireland, Scotland and Wales. He buys direct from manufacturers, and only for export, thus securing lowest possible prices. He will attend to all matters this side of the water, including Purchases, Shipments, Remittances, &c., and has facilities in New York City for securing prompt shipments at most favorable rates of freight. Manufacturers of goods suitable for Foreign Trade are invited to send in their circulars or catalogues, and quote "hard pan" prices for export, which will be considered confidential.

Second-Hand Machinery.

One 14 in. x 30 in. Whitehill & Smith Adj. Cut-off Engine, Wheel 18 in. diam., and
One 14 in. x 16 in. Tub'r Boiler for same; both almost new.
One 10 in. x 24 in. Fishkill Landing Engine, and
One 10 in. x 24 in. Tub'r Boiler for same.
One 10 in. x 24 in. Harris Corliss Engine, with Boiler, Pump and Heater, never run, price very low.
One 26 in. x 17½ in. Engine Lathe, Bed and Cross Feed.
One 22 in. x 16 in. Engine Lathe, Pond; all improvements.
Two 14 in. Pratt & Whitney Engine Lathes, with Taper Attachment, and one 10 in. x 16 in. Engine Lathe, Pond.
Two Lincoln Milling Machines. Four Brainard Milling Machines. One each 1, 2, 3 and 4 spindle Drills, and one 10 in. x 16 in. Drill.
One No. 6 Root Blower. One 80 lb. Merrill Drop Hammer, good as new. 70 feet 22 in. Double belt. 38 ft. 10 in. Double Belt.

E. P. BULLARD, 14 Day St., New York.

J. H. JENKS & CO., Manufacturing Machinists

180 Centre Street, New York,
are prepared, with a superior equipment of first-class tools and experienced mechanics, to contract for the designing and construction of special Tools, Dies, Jigs and Gages for duplicating interchangeable parts of fine machinery or sheet metal goods. Contracts for manufacturing staple goods in quantity solicited.

Eighty Bushels of Charcoal,

with a net profit of \$2 per cord of wood, can be obtained by using the apparatus patented in the United States, France, &c. The savings effected by this process amount to enough in one year's time to pay for the necessary machinery to carry out the operation. The patentee has had 17 years' experience and can give good references. Patents for sale.

CHARCOAL WOODLAND,
Office of The Iron Age, 220 S. 4th St., Philadelphia.

MILLET & BILGER, Auctioneers and Commission Merchants

112 Chambers St., New York,
Solicit from manufacturers, importers and jobbers consignments of Hardware, Cutlery, House Furnishings, &c., &c., for their regular weekly sales.

C. A. MILLET, J. M. BILGER,
formerly of Bissell, Welles & Millet. R. T. Haisell & Co.

HARDWARE BUSINESS FOR SALE.

In one of the most thriving towns in Pennsylvania, about 75 miles from Philadelphia, a well selected stock of Hardware of about \$15,000 and doing a retail cash business of \$75,000 is offered for sale on low and easy terms. Willing to retire from business reason for selling. Address,

K. T. B.,
Office of The Iron Age, 220 S. 4th St., Philadelphia.

SPECIAL NOTICE.

The undersigned, in view of the Paris Exhibition of 1878, begs to inform his friends that he continues to make translations of Catalogues, Prices-current, Circulars, Correspondence, &c., from and into the

ENGLISH, FRENCH, GERMAN and SPANISH, and that he bestows special attention upon a strictly correct rendering of Technical Expressions in matters relating to Machinery, Metallurgy, Hydraulics, &c. The very best reference will be furnished from leading manufacturers in this city, Philadelphia and elsewhere, for whom he has translated. If desired, estimates will be procured for the setting up, electrotyping and printing of catalogues, &c., in the above languages.

C. KIRCHHOFF,
Metal Reporter of The Iron Age,
83 Reade St., New York.

Special Notices.

W. GARNER, General Merchant,

Mouldsworth, near Chester, England,

Supplies nearly every class of Goods,

including all kinds of

Agricultural Machinery, Domestic Machines,

SEWING MACHINES

And Artificial Manures.

W. GARNER is open to represent any Foreign Manufacturers in England for the sale of their manufactures of whatever nature or kind. Having a wide and well established connection in the Provinces, could introduce some American, German and French products to mutual advantage.

W. GARNER is also open to buy any kind of Goods on commission, and ship them to any part of the world. Manufacturers or others desiring his assistance will please address (with full particulars in English) as above.

To Manufacturers and Jobbers of Hardware, Cutlery, &c.

Manufacturers and Jobbers, having surplus stocks or goods that from any cause are unsaleable upon which they wish to realize, or assignees who have stocks to dispose of, will find a cash purchaser by communicating with

W. M. CALDWELL,
Dealer in
Job and Auction Lots of Hardware, Cutlery, &c.,
109 Chambers St., New York.

AUSTRALIA.

AMERICAN HARDWARE CO.,
No. 9 WILLIAM STREET, MELBOURNE,
AUSTRALIA.

Solicit correspondence with American manufacturers desirous of representation in the Australian Colonies. Consignments will have prompt attention. References furnished.

PRICE BOOKS

FOR

General Hardware.

Half Leather, \$10.00. Full Leather, \$12.00.

POCKET EDITION

Just Out.

Fine Leather Binding, \$5.00. Send for circular.

Buell Lamberson,

97 Chambers St., N. Y.

For Sale.

Large Punch and Shears, 12,000 lbs., will punch 4½ in. center; two small Punches and Shears; 16x4½ feet Planer; Lathes, Drills and Machinists' Tools of all sizes; a large lot of Architectural Ironwork Tools; Wood-working Machinery; Tanks of all sizes; Hydraulic Presses; Steam Engines and Boilers of any size, from 5 to 500 horse power, and Pumps of all sizes and makes at less than one-half cost and as good as new.
256, 268 and 270 Front, near Roosevelt St., New York.

WANTED.—A SITUATION AS TRAVELING

Salesman in the Iron, Steel or Metal trade. Have an extensive acquaintance with manufacturers, machinists, &c., throughout the United States. Can give first-class references, having had nine years' experience as salesman. Salary expected moderate. Address
A. F. W.,
281 Erie St., Cleveland, O.

The Sherman Process Co.

9 Pemberton Square, Boston, Mass.,

Issue Licenses to use the Process for the

Manufacture of Iron and Steel

In the Bessemer Converter, Crucible, Siemens-Martin, Puddling, Blast and Cupola Furnaces. The use of this Process improves the quality of the product, saves fuel and labor, and does not require any change in furnace or manner of working. See page 17 of The Iron Age of Oct. 25th, 1877.

Wanted—A Partner,

In a foundry and machine business, already well established. Locality splendid and healthy. A practical man with means is wanted to join a practical man who is already well established.

Address CAR WHEEL FOUNDRY,
P. O. Box 134, Selma, Alabama.

HARDWARE BUSINESS FOR SALE.

Rare chance to purchase stock of a well-established business in central Illinois. Stock will invoice about \$4,000. The best of reasons given for selling. Address "HARDWARE,"
Office of The Iron Age, 83 Reade St., N. Y.

DROP FORGINGS.

THE TRENTON VISE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of

Iron and Steel Drop Forgings

in quantities to order at reasonable rates.

HERMANN BOKER & CO., Proprietors,
101 & 103 Duane St., N. Y.

WANTED.—A first-class business man fami-

liar with machinery and manufacturing, capable of handling large bodies of men, desires a responsible position. References satisfactory. Address,
IRON AND STEEL,
Care of P. O. Box 813, Bridgeport, Conn.

Lead, solid.....	"	02 1/2 @	....
Tea Lead.....	"	02 1/2 @	....
Zinc.....	"	02 1/2 @	....
Fewer, No. 1.....	"	07 @	....
Fewer, No. 2.....	"	07 @	....
Wrought Iron.....	per ton	\$16.00 @	....
Light do.....	"	00 @	....
Stove Plate.....	"	00 @	....
Machinery do.....	"	00 @	....
Grate Bars.....	"	3.50 @	....

The prices current for Rags, &c., are as follows:

Canyas, Linen.....	per lb	3 c @ 3 1/2 c	....
Cotton, No. 1.....	"	3 1/2 c @	....
White, No. 2.....	"	3 c @	....
Second, No. 2.....	"	2 1/2 c @	....
Soft.....	"	1 1/2 c @	....
Gunny bagging.....	"	3 c @	....
Jute butts.....	"	3 c @	....
Kentucky bagging.....	"	3 c @	....
Book Stock.....	"	3 c @	....
Newspaper Stock.....	"	3 c @	....
Waste Paper and Scraps.....	"	3 c @	....
Kentucky Bale Rope.....	"	4 c @	....
Oakum Junk, No. 1.....	"	4 1/2 c @	....
Tarred Shaking.....	"	3 c @	....
Grass Rope.....	"	2 1/2 c @	....

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending July 9, 1878.

Copenhagen.		Quan.	Value.
Hdw., cs.....	90	\$455	
Stoves, cs.....	10	60	
Hamburg.		Quan.	Value.
C'go mls, pgs.....	4	60	
Pumps, cs.....	293	203	
Mach'y, cs.....	12	825	
Lea. belt, cs.....	1	309	
Syringes, bbls.....	125	1,476	
Lea. belt, cs.....	1	234	
Sew. mach, cs.....	704	16,558	
Copper, bbls.....	139	29,765	
Ag. imp, pgs.....	24	1,320	
Hdw., cs.....	117	3,274	
Gas flxt, cs.....	9	160	
Bremen.		Quan.	Value.
Ag. imp, pgs.....	57	2,391	
Hdw., cs.....	3	100	
Rotterdam.		Quan.	Value.
Ag. imp, pgs.....	56	1,625	
Copper, cs.....	27	5,498	
Hdw., cs.....	37	1,536	
Mach'y, cs.....	4	300	
S'draper, bbls.....	31	270	
Liverpool.		Quan.	Value.
Ag. imp, pgs.....	73	5,240	
Sew. mach, cs.....	26	1,861	
R. R. cars.....	1	1,925	
Mach'y, cs.....	4	400	
Water wheel.....	1	200	
Car sp'gs, box.....	1	96	
Hdw., cs.....	73	3,339	
Havre.		Quan.	Value.
Mach'y, cs.....	12	1,530	
Ag. imp, pgs.....	39	3,375	
Mf. iron, pgs.....	3	130	
Copper, cs.....	164	38,260	
Porto Rico.		Quan.	Value.
Iron safes.....	4	370	
Ag. imp, pgs.....	12	91	
Mf. iron, pgs.....	19	503	
Hdw., cs.....	112	950	
Hull.		Quan.	Value.
Mach'y, pgs.....	6	925	
Hdw., cs.....	99	1,953	
Gas flxt, cs.....	7	41	
London.		Quan.	Value.
Sew. mach, cs.....	496	7,630	
Refrigerators.....	18	670	
Tubing, cs.....	1	648	
Mach'y, cs.....	6	136	
Belt, cs.....	1	377	
Hdw., cs.....	278	6,059	
Pumps, pgs.....	6	302	
Ag. imp, pgs.....	63	1,269	
Glasgow.		Quan.	Value.
Mach'y, cs.....	2	300	
Cutlery, cs.....	1	243	
Ag. imp, pgs.....	8	600	
British Honduras.		Quan.	Value.
Hdw., cs.....	33	655	
Mf. iron, pgs.....	15	729	
Sew. mach, cs.....	2	112	
Cutlery, cs.....	5	156	
British Guiana.		Quan.	Value.
Hdw., cs.....	18	343	
British North American Colonies.		Quan.	Value.
Coal, tons.....	277	1,021	
Mf. iron, pgs.....	1	18	
Hayti.		Quan.	Value.
Nails, kgs.....	35	126	
British West Indies.		Quan.	Value.
Iron safe.....	1	90	
Hdw., cs.....	16	310	
PT'd ware, cs.....	3	89	
United States of Columbia.		Quan.	Value.
Hdw., cs.....	95	2,316	

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending July 9, 1878:

Hardware.		Empty cartridge cs.,
Boker Hermann & Co.	Cutlery & hardware,	cs., 3
Black Wm. & Co.	Cases, 3	Shard, cs., 1
Bloomfield J. C. & Co.	Guns, cs., 2	Ward, cs., 1
Becher & Hahn.	Agate ware, cs., 1	Mdse., pgs., 4
Brookner & Evans.	Wire netting, bbl., 50	Wiesbush & Hilger Hard-
Carey Samuel.	Grindstones, 1100	ware Co.
Grindstones, cs., 13	Dougan Alex. & Co.	Cutlery & hardware,
Folsom H. & D.	Arms, cs., 9	pgs., 14
Guns, cs., 5	Graf & Nevins.	Order.
Cutlery, cs., 7	Hildick A. H.	Bundles, 200
Anvils, 1	Chains, cs., 10	Cases, 2
Chains, cs., 10	Chains, cs., 1	Chains, cs., 1
Chains, cs., 1	Headley & Co.	Boxes, 1
Boxes, 1	Livingstone W. & F.	Grindstones, cs., 45
Grindstones, cs., 45	Leonhardt H. & Co.	Agate ware, bxs., 1
Agate ware, bxs., 1	McCoy & Co.	Mdse., pgs., 2
Mdse., pgs., 2	Moore's J. F. Sons.	Guns, cs., 7
Guns, cs., 7	Empty cartridge cs.,	cs., 2
Empty cartridge cs.,	Merchants Dispatch Co.	Packages, 2
Packages, 2	Gun wads, cs., 2	Planque de Swaites,
Planque de Swaites,	Cases, 7	Rodgers S. C.
Cases, 7	Sloane W. & J.	Arms, cs., 3
Arms, cs., 3	Spies, Kissam & Co.	Gun barrels, cs., 2
Gun barrels, cs., 2	Sawyer John.	Wire rope, coils, 1
Wire rope, coils, 1	Squires H. C.	Guns, cs., 3
Guns, cs., 3	Schoverling & Daly.	Mdse., pgs., 4
Mdse., pgs., 4	Arms, cs., 1	Tin plates, bxs., 577

Byrne Joseph & Co.
Tin plates, bxs., 550
Douglas Wm.
Scrap cop'r, bbls., 500
Dale John G.
Tin plates, bxs., 1097
Terne plates, bxs., 305
Drexel, Morgan & Co.
Tin and terne plates,
bxs., 774
Haxtum Benjamin,
Lead, bars, 1170
Hendricks Bros.
Antimony, regulus,
cks., 17
Lyon & Co.
Scrap cop'r, lbs., 815
Meyer Morris,
Lead, bars, 953
Murray R., Jr.
Sheath, metal, pcs.,
223

PHILADELPHIA.

Office of The Iron Age, 250 South Fourth St.,
Philadelphia, July 9, 1878.

Pig Iron.—During the past ten days there has been very little doing in the iron trade, and it is quite likely that the balance of the month will be one of dullness and inactivity. Many of the mills and foundries, as usual at this season, suspended work on Saturday week for the purpose of stock taking, repairs, &c., and as there is not likely to be any demand of importance, the suspension may be somewhat protracted. In the present condition of affairs it would be idle to talk of better prices, as the whole market is thoroughly unsettled, and in some respects quite demoralized. It is a fact, nevertheless, that there is a more hopeful feeling, to some extent based upon the fact that it is impossible for things to be worse, and the certainty that there must be a larger movement in course of the next two months. Consumers have run stocks down to the lowest possible point, and must purchase to meet their requirements, which it is hoped and expected will be somewhat larger during the balance of the year than they were during the first six months. The activity at the Rail mills and the prospects of the Railway interests generally are having a good effect and seem to impart tone to other departments of the iron trade. The offerings of outside lots are still numerous, and tend to unsettle buyers, although as a rule the low figures at which they are offered fail to induce a purchase. The fact is that quality with many is the chief object, and standard brands of known excellence meet with a tolerably free sale at comparatively high prices, although buyers are very reluctant and purchase only to supply immediate wants, the low figures at which other brands are offered imparting a cautious and timid feeling and a fear that prices may decline still further. There is quite a probability of several Lehigh furnaces being blown out, consumption at present being entirely unequal to the production. To avoid disastrous competition it is believed that each of the leading companies will reduce their output. The Thomas Iron Co., have already set the example by blowing out one furnace, and others are expected to follow. The Robeson Furnace will shortly be put in blast for Bessemer Iron, which is scarce and in demand. We are informed by several leading companies that there are numerous inquiries for iron and offers in abundance, but at figures which cannot be accepted. No. 1 Foundry is held at \$17.50 @ \$18.50 with the majority of sales in small lots at about \$18. No. 2 Foundry, \$16 @ \$16.50; Gray Forge, \$15 @ \$16; White and Mottled \$13 @ \$14, with outside lots said to be offered without finding buyers at \$1 @ \$2 per ton less money.

Blooms.—The market continues dull and with no demand of importance. Prices are weak and almost nominal, as follows: Sunken Scrap Blooms (2464 lb), \$40 @ \$43; Northern Ore Blooms (2240 lb), \$37 @ \$39; best quality Charcoal Billets (2240 lb), for wire and steel purposes, \$50 @ \$52.50; Bars do., \$62.50 @ \$65; Sheet Iron Blooms, cornered (2464 lb), \$55 @ \$58; Cold-blast Charcoal Plate Blooms, \$51 @ \$53; run-out Anthracite, \$50 @ \$51.

Muck Bars.—Nothing of importance doing. Ag. imp. quote the market nominal at \$29 @ \$32, Philadelphia delivery.

Structural Iron.—Since the close of the month there has really been nothing of importance doing, and the market is in every respect unchanged. The anticipated contract for 6000 tons of iron for the Brooklyn Bridge seems to be in abeyance; and, in fact, other matters also which seemed likely to be closed two or three weeks ago are still held over, waiting for something to turn up. The mills have a fair amount of work on hand, however, and at present have good prospects of further orders, although nothing of importance has been closed since the beginning of the month. Prices are steady as follows: Angles, 2.2¢ @ 2.4¢; Tees, 2.4¢ @ 2.5¢; Beams and Channels, 2.7¢ @ 2.8¢.

Plate and Tank Iron.—Business is quiet and prices are nominally unchanged, although some sellers are said to be shading a little to desirable buyers. The outlook is rather uncertain, but as some of the mills have a moderate amount of business on hand there is no immediate cause of complaint, and if some pending matters are brought to a close, as it is hoped they will be, there may be enough to keep the mills at work as heretofore, although, as we said before, the outlook is not specially encouraging. We quote: Common Plates, 2.2¢ @ 2.3¢; Tank Iron, 2.3¢ @ 2.5¢; C. No. 1, 2.4¢ @ 2.6¢; Shell Iron, 2.75¢ @ 2.9¢; Flange Iron, 3.75¢ @ 4¢; Solid Firebox, 4.85¢ @ 5¢; and Best Bloom, 5.5¢ @ 6¢.

Sheet Iron.—There has been considerable inquiry for Sheet Iron and a fair amount of business for the season, but prices show no improvement. We quote: Common Sheet, No. 24 to 26, 2.0¢ @ 2.1¢; No. 27 to 28, 3.1¢ @ 3.15¢; Refined Sheet Iron, No. 25 to 28, 3.3¢ @ 3.4¢; No. 22 to 24, 3.1¢ @ 3.2¢; No. 16 to 21, 3.1¢; Best Bloom Sheets, No. 25 to 28, 5¢ @ 5.2¢; No. 22 to 24, 5¢; No. 16 to 21, 4.7¢ @ 4.8¢; Common Red Plates, 5-16 to 18, 2.4¢ @ 2.5¢; Refined Plates or Blue Annealed, 5-16 to 18, 2.5¢ @ 2.6¢; American, R. G., 5-16 to 18, 3¢ @ 3.1¢; Best Bloom, 5-16 to 18, 4.9¢ @ 5¢; Philadelphia Russia, 6¢ @ 6.5¢; A. Patent Planished, 10 1/2¢; B. Patent Planished, 9 1/2¢; Bloom Galvanized, 40¢; Refined Galvanized, 50¢.

Bar Iron.—The market is without life or animation, business is unusually light, and

prices weak and irregular. The stores are selling at 1.9¢, although some of the leading manufacturers are firm at 2¢ for the best Refined Iron. Buyers can supply themselves at any price, however, from 1.5¢ upward, but it is presumed that quality is in proportion to price paid. There are no items of interest, and the Bar trade may be called dull, stale and unprofitable. We quote Bars as before, say 1.5¢ for Common to 2¢ for Best Refined.

Steel Rails.—The market continues active, with buyers for lots of all sizes up to 25,000 tons. There is nothing calling for extended remarks, as the position of the trade has been carefully noted in previous reports, and there is no change whatever. The prospects continue good, and there is ample business to keep the mills profitably employed during the balance of the year. A few sales are occasionally made for summer delivery, but the object of sellers is to take orders for winter delivery, as they are all pretty well full for the summer and fall. Prices remain steady and unchanged, viz., \$43 to \$45 at mills, according to location, with slight concessions for late deliveries.

Iron Rails.—Inquiries are numerous, and the prospects continue quite encouraging, although we cannot learn that any lots of importance have been placed very recently. Orders are in the market, however, and it is likely that the mills will be kept pretty actively employed, as railway extensions and repairs are becoming general, and inquiries are coming in from all parts of the country. Prices are steady, but not higher, although sellers are not disposed to accept orders at the low prices ruling some time back. We quote ordinary sections at \$32.50 to \$34.50, according to quality and terms of payment.

Old Rails.—The market is steady but not specially active, buyers preferring to wait rather than meet the advanced views of sellers. For good qualities \$19 @ \$19.50 is asked for spot lots, with buyers at about a half dollar less, but very little actual business has transpired. Sales of a few hundred tons are reported at \$19, delivered at outside points, and it is quite likely that good qualities would realize that figure, Philadelphia delivery, but, as we said before, buyers are not eager to anticipate their wants, unless at prices ruling some time ago. We quote the extreme range of the market \$18.50 @ \$19.50, according to quality and terms of settlement.

Old Car Wheels.—There is no demand unless at very low prices, sellers ask \$16.50 @ \$17, while buyers offer about \$1 less.

Scrap Iron.—The market is irregular and lower with a good deal of Wrought offering at about \$20. We note a sale of 120 tons of Portuguese cannon and shot, the former stamped Lisbon, 1766. The price realized was about \$18 and \$14.50. We quote: Wrought Scrap, \$20 @ \$21.50, and Cast, \$14 @ \$15.50.

Nails.—The market is very dull, but prices are more uniform than they were a couple of weeks ago. The nominal price to the trade is \$2.30, and business is chiefly on that basis.

PITTSBURGH.

[By Telegraph from The Iron Age.]

PITTSBURGH, Pa., July 10, 1878.

The regular monthly meeting of the Western Nail Association took place here to-day, and it was largely attended. Wheeling and many of the factories in the valleys were represented. The situation was fully discussed, but, contrary to expectation, no action was taken in regard to price or production, so that the situation remains unchanged, and there will be nothing done in this regard until the August meeting, if then.

Office of The Iron Age, 77 Fourth Avenue,
PITTSBURGH, July 9, 1878.

While the weather continues extremely hot it is very favorable for harvesting, and from nearly all quarters comes the same report—big crops—and with a couple of weeks more good weather the great cereals will have been secured. With abundant crops and Congress adjourned, there would be reason to look for better times soon but for the fact that the repeal of the bankrupt law does not take effect until September 1st. There are so many going into bankruptcy that confidence is very weak. The volume of business here could be largely increased but for this lack of confidence. Our manufacturers and merchants as well have come to the conclusion that their goods are much better property than the paper of those about whom there is a shadow of doubt, hence they are utterly refusing to sell except for cash to those whose orders were eagerly solicited a few years ago on 30 to 90 days' time, and to this may be attributed largely the dullness which has prevailed all this year.

The remarks of your correspondent here in the last issue of The Iron Age, in regard to granting extensions to suspended firms, meet with general approbation. It is right and proper in some instances, where the parties asking it are honest and there is a reasonable probability of their being able to comply with their obligations, to grant an extension, but otherwise it is not, nor is it fair to put those who have settled with their creditors at 10 to 50 cents on the dollar to be paid in one to three years without security, in competition with others in the same business who are expected to pay one hundred cents on the dollar. Moreover, it has been developed during the past few years that but few of those who obtained extensions were able to comply with the terms of their composition, and it would have been better for all concerned if they had been put into bankruptcy at the start. In times like these, when at best there is little or no margin for profit, there is not much chance for an embarrassed firm to make any headway, and then with no credit they can obtain no stock excepting they pay cash for the same.

Pig Iron.—There has been no particular change in the market during the past week. Business continues dull, as it nearly always is at this particular season, while prices remain about as last quoted. Owing to recent failures and suspensions, in consequence of which furnaces have lost or will lose heavily, many furnacemen are now disposed to sell only for cash. They claim, and very truly,

that the market is in such an unsatisfactory condition at best that they cannot afford to take any chances. Moreover, it appears to be generally admitted that hard pan has certainly been reached. Then stocks are light, as is also production; and with any improvement in the demand for the products an increased demand for raw iron is almost certain, which in time would be followed by better prices. Bituminous Coal Smelted—\$18 @ \$21, 4 mos., for Foundry, and \$17.50 @ \$18.50, 4 mos., for Gray Forge. Sale of 500 tons Gray Forge Red-short at \$17.50, cash. Coke Irons—\$15.50 @ \$17, 4 mos., for No. 2 and Foundry. Bessemer weak, but unchanged. Sale of 1000 tons last Saturday at \$19.50, 4 mos., delivered free on cars in Pittsburgh.

Manufactured Iron.—There is nothing particularly important to note, excepting a firmer feeling, the result largely of the recent failures, which have developed that selling iron, or anything else, below cost of production can have but one ending; hence there are but few, if any, willing to sell at the cut-throat prices prevailing some time ago. Then, as stated in our last report, the fact that several mills are embarrassed or stopped, and not likely to be started up soon, thereby keeping down production, is not without its influence in the same direction, and as stocks are light in the hands of both jobbers and consumers, an increased demand within the next few weeks is not improbable. At the present time business is quiet, and while some few of the mills are said to be pretty well supplied with orders the majority of them are not so situated; the outlook, however, is considered favorable for a fair fall trade, and we think, as prices appear to have settled and there is no probability of them going any lower, that there will be an increased volume of business before very long. We continue to quote on a basis of 1.70¢ @ 1.80¢, 60 days, for Best Refined Bars.

Nails.—The market remains in much the same condition noted in our last two or three reports; except at ruinous prices the demand is light, as it always is at this particular time, and nearly all the factories are reported stopped, both here and at Wheeling. While there are no established rates, manufacturers generally quote at \$2.10, net cash; however, rumors still prevail of sales at \$2 rates, and we hear of a sale of 2000 kgs having been made quite recently at the rates last named, and that, too, by a Pittsburgh manufacturer. It is asserted by those who are in a position to know that there is no margin at \$2 rates, and but very little at \$2.10; yet that sales have been and are still being made at the inside rates there is no reason to doubt. The explanation of this lies in the fact that there are some manufacturers who need money, and they are obliged to realize at the best figure they can obtain. The probability is that an advance will be established by the Western Association next month, if not before, and we would advise both jobbers and consumers to buy all they can obtain at \$2 rates, as prices are more likely to go higher than lower.

Horse and Mule Shoes.—There is a moderate inquiry; no change in prices. We continue to quote Juniata brand in 100 keg lots at \$3.37 1/2 @ \$4.37 1/2, cash. Larger lots special rates.

Steel.—The market continues rather quiet, as it usually is in the early part of July, but the indications are favorable for a good fall trade. It is worthy of mention that American Steel has almost entirely driven the foreign article from the American markets, and moreover, some of our American manufacturers have the assurance to cope with foreign manufacturers in foreign markets. In a word, there has been a very decided change in the steel trade of this country within the past few years; it has grown rapidly and continues to grow. Prices remain about as last quoted: Tool Steel, 11¢ @ 13¢, most of sales at 11 1/2¢ @ 12¢. Machinery Steel, 5¢ @ 7¢; Spring Steel, 6¢ @ 7¢; Boiler Plates, 7¢ @ 8¢.

Rails.—The market for Steel Rails continues steady at \$44 @ \$45, cash, delivered at mills; the last sale reported was at \$44, prompt cash. The Edgar Thomson Mill shut down last Wednesday and started up yesterday. Steel Blooms quoted at \$42, cash, delivered at mills; Steel Billets, \$45, cash, and very firm; Steel Rail Ends—none in market; Old Iron Rails quotable at \$19.50 @ \$20.50, cash, according to quality, no sales reported recently.

Wrought Iron Pipe.—Business is generally reported dull for the season, with no improvement in prices, which to manufacturers are very unsatisfactory. Discount on Gas and Steam Pipe still quoted at 60¢ @ 65¢; Boiler Tubes, 40¢; Oil Well Tubing and Casing, net cash.

Scrap.—The market for all kinds of Scrap continues quiet, but an improved demand within the next few weeks is expected. Stocks comparatively light, prices unchanged; may be fairly quoted as follows: Old Car Wheels, gross ton.....cash \$18 @ \$19
Car Springs, net ton....." 34 @ 35
Car Axles, net ton....." 28 @ 29
No. 1 Wrought Scrap, net ton....." 20 @ 21
Boiler Scrap, net ton....." 23 @ 24
Wrought Turnings, net ton....." 14 @ 15
Cast Turnings, gross ton....." 10 @ 11

Window Glass.—The demand continues light, and nearly all the factories are taking their summer rest, which commences July 1 and continues until Sept. 1. Discounts unchanged; by the car load, 75%, 60 days, 2% off for cash.

Coke.—The demand has fallen off somewhat within the past few weeks, but there is more doing than usual at this season of the year. The consumption from the 1st of January to the 1st of July has been larger than ever before during a corresponding time, having, in consequence of its cheapness, supplanted Coal for many purposes. We continue to quote at \$2.15 @ \$2.18 1/2 ton, delivered free on board cars in Pittsburgh.

Coal.—The Coal trade continues in a very unsatisfactory condition, with but little prospect of any immediate improvement. The pool at Cincinnati having been dissolved, there is no established price there; and then the supply, not only at Cincinnati, but at Louisville, Memphis, New Orleans and at other points upon which we are dependent to take our Coal, is large, and the

only bright spot lies in the fact that its cheapness has increased the consumption.

Petroleum.—This important interest has been in a very unsatisfactory condition to both producers and refiners all this year, but the indications are that the volume of business will be considerably larger from July to January than it has been from January to July, as the exports show considerable of a deficiency as compared with same time in 1877.

CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts.,
CHATTANOOGA, July 9, 1878.

The city and country have been intent on celebrating rather than on business during the week just closed. There has, however, been much buying and selling. Men mixed pleasure with business, and made their purchases in the city while their families were seeing the sights and listening to the patriotic din. The iron trade has been fair. Inquiry for wheel metal has been more frequent of late, indicating some improvement in sales in the future. About 700 tons of Gray Forge have been disposed of to consumers, prices ranging from \$13 @ \$14 per ton. The general iron trade has rather improved this month—a time when it generally falls off. This is particularly true of smaller articles. The weather has been hot and showery during the week.

Pig Iron.—There is probably a better prospect ahead. Slightly better stocks in the hands of consumers are very light, and furnacemen have not accumulated largely. The steady working of the mills has kept down the stocks, and until lately there has not been a full supply of foundry in market. The latter grade is now, and has been for several weeks, plentiful and the market easy. There is no quotable change since our last report. We quote: Coke Irons, No. 1 Foundry, \$17 @ \$18; No. 2, \$15 @ \$16; Gray Forge, \$13 @ \$14; White and Mottled, \$11 @ \$12. Hot Blast Charcoal—No. 1 Foundry, extra, \$20 @ \$21; do., \$18 @ \$20; No. 2 Foundry, \$16 @ \$18; Gray Forge, \$15 @ \$17; White and Mottled, \$15. Cold Blast Charcoal—Car Wheel Metal, \$22.50 @ \$27.50; do., Extra Standard, \$24.60 @ \$29.50; Forge, \$17.60 @ \$22.

Muck Bar.—\$27 @ \$34; Old Rails, \$17 @ \$17.50. Old Car Wheels, \$18.

lots. Spelter is firm, closing at 4 1/4¢ @ 5¢ on the spot for 10-ton lots. Tin has ruled very quiet, the transactions having been insignificant. Charcoal Plates are strong on both sides of the Atlantic and Coke Plates are weak. The Bavarian, from Liverpool, brought 200 bxs. Tin Plates, S. May & Co.; 242 bxs. ditto, Thayer & Lincoln; 48 bxs. Black Taggers; 167 bxs. Tin Plates, order. The Palestine, from Liverpool, brought 565 bxs. Tin Plates, Fuller, Dana & Fitz; 1297 bxs. ditto, S. May & Co.; 1182 bxs. ditto, order. We quote: Straits, 14 1/4¢ @ 14 1/2¢; Banca, 17 1/4¢ @ 17 1/2¢; Refined English, 14 1/4¢ @ 14 1/2¢, gold. We quote Plate: Charcoal, L. C., \$6 @ \$6.25; Coke, \$5.12 1/2 @ \$5.25; and Terme, \$5.25 @ \$5.50, gold.—Commercial Bulletin.

CINCINNATI.

Messrs. E. L. HARPER & Co. (successors to Messrs. L. R. HULL & Co.), under date of July 6, write us as follows: Even the most fortunate producers can derive no satisfaction from contemplating the prices ruling today. In its steadily downward course the market has reached a point where there is no margin left for any, and most of the furnaces are certainly losing money. It is hoped that the present exceedingly low rates may prove finally beneficial by shortening the agony and hastening a more healthy state of trade, and this view is reasonable, although no one can form an intelligent opinion as to the time when the long looked-for improvement will come.

HOT-BLAST FOUNDRY.

Hanging Rock C. C. No. 1.....\$21.50 @ 22.00
C. C. No. 2.....19.00 @ 20.00
Alico, No. 1 Extra, L. M.....20.00 @ 21.00
" No. 1, N. O.....19.00 @ 20.00
" No. 1, N. O.....18.50 @ 19.00
Hanging Rock Coke and S. C. No. 1.....18.50 @ 19.00
S. C. No. 2.....18.00 @ 18.50
Virginia Coke, No. 1.....17.00 @ 17.50
Shawnee S. C. No. 1.....16.50 @ 17.00
S. C. No. 2.....16.00 @ 16.50
Hocking Valley S. C. No. 1.....15.50 @ 16.00
S. C. No. 2.....15.00 @ 15.50

POURCE IRONS.

Hanging Rock, No. 1 C. C.....18.00 @ 19.00
Hanging Rock, No. 1 C. C.....16.50 @ 17.00
Longdale, No. 1 C. C.....16.50 @ 17.00
Ala. and Tenn. No. 1 C. C.....16.50 @ 17.00
Red-short, No. 1 C. C.....15.50 @ 16.00
Cold-short, No. 1 C. C.....15.00 @ 15.50
Old Ralls, prime.....cash, 19.00 @ 20.00

CAR WHEELS AND MALLEABLE.

Hanging Rock C. C. No. 1.....31.00 @ 32.00
Cherokee C. C. No. 1.....30.00 @ 31.00
Southern and Western Brands.....28.00 @ 30.00

ST. LOUIS.

Specially reported by Messrs. SPOONER & COLLINS, Iron Commission Merchants, 217 North Third street, St. Louis, under date of July 3: Sales of Pig Iron the past week have been very light. We anticipate but little business till after the 1st of August. Present indications for a fair demand after that time is good. We notice no change in prices of standard brands of Pig Iron. We see no probability of any further reduction. We still have a good demand for Old Ralls, but at very low prices. We quote you as follows, on 4 months' time:

	No. 1.	No. 2.	Mill.	White and M'ld
M'ouri Stone Coal	\$22.00	\$20.00	\$19.00	\$17.00
Missouri Charcoal	20.00	19.00	18.00	16.00
Tenn. Charcoal	20.50	19.00	17.50	16.00
Tenn. Coke, very soft and strong	20.00	19.00	17.00	15.00
Hang. Rock Charcoal	24.00	23.00	21.00	19.00
Hang. Rock Charcoal, Cold-short	23.00	21.00	20.00	18.00
Extra No. 1, M. Ore.	No. 1.	No. 2.	No. 1.	No. 2.
Extra No. 1, M. Ore.	No. 1.	No. 2.	No. 1.	No. 2.
Extra No. 1, M. Ore.	No. 1.	No. 2.	No. 1.	No. 2.
Hang. Rock Coke	23.00	22.00	21.00	19.00
Morbala Black band Ores	23.00	22.00	21.00	19.00

COLD-BLAST CHARCOAL—All Numbers.

Hanging Rock.....4 mos. \$28.00 @ 32.00
Tennessee.....4 mos. 25.00 @ 30.00
Kentucky.....4 mos. 25.00 @ 30.00
Missouri.....4 mos. 25.00 @ 30.00
Georgia.....4 mos. 25.00 @ 30.00
Alabama.....4 mos. 25.00 @ 30.00
Assorted Bar Iron.....1.75 @ 2.00
No. 1 Railroad.....70 @ 75
Heavy Cast Scrap.....50 @ 55
Light.....40 @ 45
Old Ralls.....4 mos. 19.00 @ 20.00
Old Car Wheels.....4 mos. 17.00 @ 18.00

BALTIMORE.

Mr. W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following prices, under date of July 8: Trade rules quiet and disappointing for the season, the extreme warm weather prevailing for the past week adding much to cause the same. Values are firm at unchanged figures:

Refined Bar Iron, 1 to 6 wide by 3/4 to 1 thick.....\$1.85 @ 2.00
Refined Bar Iron, 1 to 4 1/2 wide by 1/2 to 3/4 thick.....1.85 @ 2.00
Refined Bar Iron, 3/4 to 1 Round and Square.....1.85 @ 2.00
Hoop iron, 1/4 wide and upward.....2 1/2 @ 2 3/4
Band iron, from 1/4 to 1 in. wide.....2 1/2 @ 2 3/4
Horse-shoe Iron.....2 1/2 @ 2 3/4
Norway Nail Rods.....2 1/2 @ 2 3/4
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes.....13 @ 14
Machinery Steel.....6 @ 6 1/2
Cast Spring Steel.....7 @ 7 1/2
Homogeneous Steel Plate.....13 @ 14
Common Horse Nails.....13 @ 14
R. R. Spikes, 5 1/2 x 16.....27 1/2 @ 28
Perkins' Horse shoes, 7 keg of 100 lbs.....37 1/2 @ 38
Mule shoes.....4 1/2 @ 5
Putnam Horse Nails.....18 @ 20
Globe Horse Nails.....18 @ 20
Less line discount to the trade.

Messrs. R. C. HOFFMAN & Co., Iron and Commission Merchants, No. 23 South Frederick street, report the Pig Iron market as follows, under date of July 8: Below we quote you present prices of Pig Iron and Blooms:

Baltimore Charcoal Pig.....\$26.00 @ 28.00
Virginia.....26.00 @ 28.00
Anthracite No. 1.....18.00 @ 19.00
" No. 2.....16.00 @ 17.00
" Mottled and White.....13.00 @ 14.00
Charcoal, C. B. Blooms.....50.00 @ 52.00
Refined Blooms.....43.00 @ 45.00

RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, Richmond, Va., writes as follows under date of July 8: A moderate

demand exists for Foundry grades of Pig Iron, and some inquiry for Old Ralls on basis of the following quotations:

American Scotch Pig Iron.....\$22.00 @ 23.00
Anthracite, No. 1.....18.00 @ 19.00
" No. 2.....16.00 @ 17.00
" Mottled.....14.50 @ 15.50
Coke, No. 1.....18.00 @ 19.00
" No. 2.....16.00 @ 17.00
Va. Cold-blast Charcoal, Cold-short.....20.00 @ 22.00
Va. Cold-blast Charcoal, Neutral.....27.00 @ 28.00
Va. Warm-blast Cold-short.....18.00 @ 21.00
Va. Warm-blast Red-short.....17.00 @ 18.00
Old Ralls.....16.00 @ 17.00
Wrought Scrap No. 1.....17.00 @ 18.00
Cast (machinery).....17.00 @ 18.00
Richmond Refined Bar Iron.....20.00 @ 21.00
Horse Shoes per keg.....4.95 @ 4.50
Mule.....3.50 @ 4.00
Old Dominion Nails, Standard Size, keg.....2.40 @ 2.50
Freights to Philadelphia, \$1.40 per ton of 2400 lb., by rail.
Freights to New York, \$1.60 per ton of 2400 lb., by rail.

LOUISVILLE.

Messrs. GEO. H. HULL & Co., under date of July 7, write us as follows: The market is without change, either in tone or price. There is very little disposition to force sales, as stocks are light and generally in the hands of those who are able to hold. Consumers have small stocks, and any considerable demand would exhaust some grades. The usual time, 4 months, allowed on quotations below:

FOUNDRY IRONS.

No. 1 Hanging Rock, Charcoal.....\$21.00 @ 22.00
No. 2 Southern, Charcoal.....19.00 @ 20.00
No. 1 Hanging Rock, Stonecoal and Coke.....19.00 @ 20.00
No. 1 Hanging Rock, Stonecoal and Coke.....17.00 @ 18.00
No. 1 Southern, Stonecoal and Coke.....17.00 @ 18.00
No. 2 American Scotch.....16.00 @ 17.00
Silver Gray.....15.00 @ 16.00

MILL IRONS.

No. 1 Charcoal, Cold-short and Neut'l.....16.00 @ 17.00
No. 1 Stonecoal and Coke, Cold-short and Neut'l.....16.00 @ 16.50
No. 1 Stonecoal and Coke, Cold-short and Neut'l.....15.50 @ 16.00
No. 1 Missouri and Indiana Red-short.....20.00 @ 21.00
White and Mottled, Cold-short and Neut'l.....13.00 @ 15.00

CAR WHEELS AND MALLEABLE IRONS.

Hanging Rock, Cold-blast.....30.00 @ 32.00
Alabama and Georgia, Cold-blast.....25.00 @ 27.00
Kentucky, Cold-blast.....23.00 @ 25.00

Messrs. W. B. BELKNAP & Co., Iron and Steel merchants, Louisville, Ky., under date of July 8, write: We have to note this week most encouraging indications of improvement in business. Orders are fuller and more miscellaneous in character. Iron, Steel, Nails and all varieties of heavy and Carriage Hardware being well represented. Prices, too, are manifestly firmer, and jobbers find it difficult to replace goods at the prices at which they are selling. It is very evident that the improved tone of the market is not so much due to any revival of confidence, big harvests or increased demands for consumption as simply to the decline in excessive competition. The weeding-out process of weak mills and weak mercantile firms has been unusually rapid of late, and those who survive begin to have the courage to demand at least a new dollar for an old one. We desire to place on record our hearty commendation of the remarks of your Pittsburgh correspondent in last week's issue, touching the practice of granting extensions to concerns whose embarrassments have been due to reckless underselling. Creditors who compromise with their insolvent debtors are simply doing their best to reduce their solvent customers to the same category. In nine cases out of ten the effort, during times of business depression, to galvanize dying firms into life, is disastrous to all concerned. Better that they should be permitted to die a natural death and allow those to live who have not already been fatally weakened.

FOREIGN.

FRANCE.

(Moniteur des Interets Matériels.)
PARIS, June 23, 1878.—Metals.—The continually damp weather creates some apprehension as to the crops. Business in general revives but slowly, but the outlook is if anything encouraging. Copper has now become steadier; wide fluctuations are hardly to be expected in the immediate future. We are tolerably firm here, and quote as follows: Chili Bars, deliverable at Havre, 167.50 francs the 100 kilos; Common ditto, 162.50; Ingots and Slabs, 165; Best Selected, 175; and pure Corcoro Ore, 174. Copper is neglected at Marseilles; they quote: Spanish, in slabs, 160; Red Tokat, 165; small refined Ingots, 175 @ 180; Sheathing, 190; Bolts, 197.50; and Yellow Metal Sheathing, 197.50. Tin—Great weakness is still perceptible here. We quote: Banca, 180 francs the 100 kilos; Billiton and Straits, 170; and English and Australian, 167.50. There is no demand at Marseilles, where they quote: Banca, 185; Straits, 170; Billiton, 170; and English Refined, 167.50. Lead is picking up but slowly. The quotation here remains 41 @ 41.50, according to sort. Lead is more inquired after at Marseilles, but the firmness of holders checks business. They quote: First Fusion Soft, 40 to 42.50 francs; the second ditto, 37; and the third, 35. Antimony is worth 145 @ Marseilles, Spelter has not distinguished itself by much activity, but, nevertheless, remains firm. We quote: Silesian here, 45.50 francs the 100 kilos, and at Havre, 47 francs the 100 kilos; and at Marseilles, 47 francs. They quote: Sheet Zinc, as to brand, 50 @ 61 francs, less 3%; old remelted in slabs, 43; Adra, 43; and Malaga, 30. Iron—There is little change in the general aspect. There are but few orders; prices are weak, notwithstanding the great efforts that are being made to bolster up the value of iron. Here merchant iron sells at 160 @ 170 francs per ton, according to size of lots. The continual weakness in Merchant and Sheet Iron has caused several establishments to curtail the production thereof and seek the making of specialties instead. In the Champagne district Nails, Machinery and Chains are neglected. Little is transpiring there in affluence Pig Iron. Moulage No. 3 is taken at 35 @ 35 francs. Iron Wire is about the only article selling steadily. The Loire basin shows more animation. The Northern Railroad has ordered 60 locomotives, 20 of which the Creusot will make. Some animation seems to be impending in Sheet Iron. The same railroad company has ordered 800 Bessemer Steel axles. The Navy Steel Works have been ordered to furnish the plates for the Vengeur iron-clad, now being built at Brest. There will be required for this vessel 2000 tons of plates. Prices are low, but activity is reviving in that locality. The iron dealers have also sent in some orders. In the Meurthe and Moselle the Longwy Pig Iron is being superseded by Belgian Pig and Nancy Pig. Activity is by no means great, yet stocks are being worked off tolerably well. In the Department of the North prices are improving slightly, so far as Merchant Iron is concerned, but the price has not yet risen above 157 @ 159. The Louvroil Rolling Mills are about to resume operations. Coal—We are witnessing at Paris an extraordinary competition just at present between Belgian and English Coal. Ironmasters in this vicinity anticipate a few more weeks of a dragging market for French Coal. After a while we may look forward to a brisker demand for French Coal.

BELGIUM.

(Revue Universelle.)

BRUSSELS, June 23, 1878.—Iron.—Business has been quiet during the last few days. Merchant iron is selling at Charleroi at 155 francs; Beams do not bring over 127.50 @ 130 francs. Common Sheet Iron may be had at the low figure of 170 @ 175 francs. Mr. Berghem, the leading mining engineer, has just published his report on iron industry in the leading province of Namur for 1877. A good many mines which were still being operated in 1875 and 1876 have gradually been discontinued to be worked since. In 1875 iron ore was still being raised in 21 counties, in 1876 in but 18 and in 1877 in but 15 counties. In 1877 there have been extracted 185,000 tons of iron ore by 972 operatives, whose average wages were 2.74 francs per day, the value of the ore being 1,639,000 francs. From this ore there were made, after washing, 161,500 tons, yielding in money value 1,703,000 francs. The cost of extracting having been 1,496,000 francs, 745,000 of which were wages, there was a profit of 234,000 francs. The decline in production in 1877 as compared with 1876 has been about 15%, while the production in 1876 was already but 33 % of what the year 1865 had yielded. This decline of ore production in the Namur district is due to the competition of a falling price of iron. At Liege iron constructions for railroad and water-work purposes have again gone very low. While we are thus complaining in Belgium the Otange-Rumelange foundry in Luxembourg, near the hand, is producing in turning out Cast Iron Pipe for water works, its specialty. A check has, however, been put upon Pig Iron production in the Grand Duchy, of which we are glad. Coal has been looking up in the Mons and Charleroi basins.

GERMANY.

(Borrenshalle.)

HAMBURG, June 22, 1878.—Metals.—Metal matters are picking up but slowly, and even supposing the Berlin Congress leads to peace and a permanent settlement of European affairs, we shall have little cause to be sanguine about the future, at least not in Germany, for in this country we have other and more important local questions pressing forward, and keeping the public in a ferment much greater than any turn in Eastern affairs possibly could have done—we mean the parliamentary elections and the future composition of our national legislature. Copper.—The markets have been stagnant, nor can we report any change anywhere, the quotations remaining nominally the same as we have lately given them. Tin.—Our markets have been inanimate without any tendency either way, and we leave quotations unaltered. Lead.—A slightly improved feeling is noticeable without as yet leading to a positive rise. Spelter is uniformly firm all over Germany. To-day's market may, however, still be procured at Breslau at 16.75 marks the 50 kilos.

HOLLAND.

(Roch & Vierboom.)

ROTTERDAM, June 25, 1878.—Tin.—After a few days of a falling price, tin has now relapsed into quietness, and some sales of Banca have been effected at 39.25 guilders the 50 kilos, at which more may be procured. Meanwhile Billiton remains steady at 37.75 spot and 38 to arrive.

EAST INDIES.

(Dummett & Co.)

BATAVIA, JAVA, May 6, 1878.—Metals.—Since our last review a quieter tone has prevailed in our market, and values of some goods could not be maintained, in consequence of which, in order to effect sales, some reduction on former prices had in many instances to be allowed. Iron.—Both Swedish and English is neglected and quotations are entirely nominal. Copper Sheathing is very weak, especially Dutch, which is only saleable at a considerable reduction on former rates. A few cases of English have changed hands at 75 guilders per picul. Tin.—On Tuesday, the 11th prox., about 10,000 piculs of Billiton will be sold at auction. Coal.—A sale of West Hartley at 21.75 guilders, deliverable on the coast, has been effected. Tonnage.—32,000 tons of cargo are to be reported regarding the position of our freight market. Tonnage is plentiful, but cargo is wanting. Exchange.—During the period under review transactions have not been on a very extensive scale, and although the tendency of rates continued in favor of sellers, quotations at the close show little difference with those ruling at the date of our last issue. The closing rate is 12.07 1/2 guilders the pound. (Aitken, Spence & Co.)

COLOMBO, Ceylon, May 10, 1878.—Plumbago.—The supplies are very limited and prices are steady. Shipments from Oct. 1 to the 21st inst. have been the following: To the United Kingdom, 24,345 cwt.; to Marseilles, 225; to India and the East, 259; to Australia, 105; and to the United States, 13,063; to Ceylon, 72,000 cwt. During the period of last year, 81,944 in 1876 and 65,832 in 1875. Freight very quiet. The bark Rusch, 375 tons, is loading for London, and the French barque Clementine and Alice, 300 tons, begin to load for New York City. No steam tonnage available. Plumbago freight rates to London are 35/100 ton by rail and 55/100 ton by steam. Exchange, 1/8 1/2 @ 1/9 1/2.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., June 24, 1878.

THE WINTER OF OUR DISCONTENT has, in respect of weather, been changed into glorious summer during the past few days, and we are at the present time experiencing the first really hot sun of the season. The alteration is heartily welcome, and comes just in time to save the hay and cereal crops—the former mostly cut and the latter suffering greatly from the previous continuous downpour. To the hardware trade the change cannot fail to be gratefully observed, inasmuch as it affords vastly improved harvest prospects, the consideration of which at this time of year invariably exercises considerable influence upon the course of business. With the probability of a good harvest the retailers generally begin to lay in stocks of implements, tools, &c., and so give animation—sadly wanted at the present time—to the home departments of the Birmingham and Sheffield manufacturers and factors. Our

FUTURE PROSPECTS

are generally thought to be fairly good, but within the past few days there has been some uneasiness arising out of the reported Congressional disension at Berlin. These phases I ventured to predict last week, and I again give it as my opinion that there will be oscillations of hopes and fears, but that in the end—which everybody fervently hopes is now high at hand—peace and tentative prosperity will be inaugurated. The agreement between Schouvaloff and Salisbury is universally believed to be genuine, and is a disappointing blow to the hopes of those who have so ardently pinned their faith to the plan of uncompromising resistance to Russian ambition.

THE BANK OF ENGLAND

has just made an alteration in its discounting rules which has attracted much attention in the financial world, especially as it is claimed that by adopting the new mode of procedure the risk of panics in periods of excitement and pressure will be materially minimized. Previously the bank rate of discount has often been as much as 1 and 1 1/2 per cent. over the outside market prices, so that customers have had to take their paper to these exterior discounters. Now

and then, however, the outsiders would come to the conclusion, judging from the ample sources of information open to all the world, that the bank would shortly raise its rate, and would "put up" their rates in order to discount the (as they surmised) forthcoming official rise. When this happened there was naturally a run on the bank, and panics were occasionally the results. Now the "Old Lady of Threadneedle street," as the Bank of England is facetiously dubbed, will compete on level terms, and by realizing certain securities will devote over £11,000,000 particularly to that branch of the business. Anything that diminishes the risk of these hurtful and absurd fluctuations ought to be welcomed by the commercial community.

ANOTHER GIGANTIC BRIDGE

scheme is in process of incubation; in fact, we are gravely told that plans exist for an enormous iron structure of this class over the Forth, for the accommodation of the railway traffic on that side the country. It is stated that nearly £1,000,000 have already been subscribed for the purpose of effecting its construction. Here is an undoubted chance for some of your enterprising bridge builders. They can do "big things" at home, and this will certainly be the biggest of the big here when it shall have been built.

INDIAN RAILWAY PROJECTS

continue to be set before us. In Baroda 35 miles of new road are in course of construction; in Kattiawar 180 miles are projected; a 400 miles addition to the State Line to Ajmer is spoken of, and a further 232 miles is projected in Kutch territory. The making of these lines ought to find somebody or other some work.

SCOTCH PIG IRON

has not been particularly active during the week, but makers' quotations have been well maintained. There are now 177,351 tons in store, a growth of 474 tons in the seven days.

Writing from Glasgow, June 21st, Messrs. James Watson & Co. said: "There is no new feature in the Scotch pig iron trade during the past week, although prices have been a shade firmer. The market opened on Monday at 50/0 1/2 per ton, and advanced to 50/2, cash. On Tuesday forenoon the price improved from 50/2 to 50/3, closing quiet in the afternoon at 50/1 1/2 per ton. On Wednesday it again advanced from 50/2 to 50/3, relapsing at the close to 50/2 per ton. Yesterday the market was dull, transactions taking place from 50/2 1/2 to 50/1 1/2 per ton, while to-day it is again lower, business being done from 50/1 1/2 to 50/0, cash, closing sellers at the latter figure. Shipments last week were 10,310 tons, against 10,738 tons in the corresponding week of 1877." We quote:

	No. 1.	No. 2.
G. M. B., at Glasgow.....	50/1	48/6
Gartsherrrie, ".....	50/1	48/6
Coltness, ".....	50/1	48/6
Summerlee, ".....	50/1	48/6
Langloan, ".....	50/1	48/6
Carbros, ".....	50/1	48/6
Calder, at Port Dundas.....	50/1	48/6
Glenarack, at Ardrossan.....	50/1	48/6
Eglington, ".....	50/1	48/6
Dalmellington, ".....	50/1	48/6
Shotts, at Leith.....	50/1	48/6
Kinnell, at Bonness.....	50/1	48/6

The figures of Wm. Colvin & Co. and John E. Swan & Bros. are similar to these.

IN CLEVELAND

the death of Mr. Bolckow has caused much regret. He was one of the founders of Middlesboro', and with the late John Vaughan pioneered onward a concern which is now the largest in the whole world. The newspaper biographies of the deceased detail many interesting facts and circumstances in connection with his career and the works he managed. The large foundries of the North are pretty well engaged. Messrs. Head, Wrighton & Co., of Stockton, are running off an extensive order for chairs for the Northwestern Railway Company. Hopkins, Gilkes & Co. are also busy, much of their work being heavy mains, hydraulic castings and bridge-building iron. The plate and angle mills have a fair average employment. It is stated that two new foundries are about to be erected near Middlesboro', and there is even some talk of putting up tin-plate works thereabouts. The neighborhood ought to be suitable for the latter industry, seeing that chemical works are very numerous in the district.

ENGLISH AND AMERICAN PLATED WARE

is now a subject of newspaper discussion, anent a statement that American electroplate was being "largely" imported into this country. A. W. Stainforth, of Sheffield, however, comes forth as the champion of the home interests and asserts that most of your plate is what is known as soft ware, namely, Britannia metal electro-plated, instead of the "base" being good hard nickel.

TRADES OF SHEFFIELD.

The course of business at Steelopolis runs smoothly indeed. The current is so exceedingly gentle in many quarters that its ripples can scarcely be discerned. The near approach of the Berlin Congress, and then its actual meeting, excited ardent expectations and hopes, but so far these aspirations still remain in that category, and many a hard-working manufacturer must be content to see the fruition of his wishes and preparations deferred. All the several branches of the iron works are notable examples of the continued prostration. At John Brown & Co.'s, for instance, there are very few more than 2000 workmen engaged, whereas in times of ordinary prosperity the number is generally 5000 to 6000. At the adjoining works of Cammell & Co. there are now under 3000 men, in place of the customary complement of 5000. The smaller establishments show the same disparity of results. There can be little doubt, in fact, that in these, as in other cases, the iron departments are rapidly becoming subservient to those devoted to steel making. Ship plates are now of steel, as also are frame plates and certain engineering requisites, all of which were formerly made in iron alone. For armor plates a good deal of mild Siemens steel is being made use of, and there is an extensive make of tyres, &c., from the same material. Wire is also now very largely rolled in the newer metal, and such goods as are wholly or partially of sheets are being increasingly constructed of Bessemer. In the course of a flying visit to Sheffield the other day I heard of no especial change in the leading indus-

tries, albeit some of my friends report a pretty steady business in best cutlery—table and pocket—with Australia, India, Canada, the United States and Cuba, together with some augmentation of the demand for files, fine and special saws, and all kinds of joiners' tools. Special lots of machinery have also been sold for the Cape and Egypt. John Brown & Company have declared a dividend of 5 per cent., leaving the reserve fund untouched, and carrying forward to next year £27,264. They are now making Pullman car angles.

STAFFORDSHIRE AND BIRMINGHAM

are very much as heretofore in most respects, the best houses being in tolerable activity, while all the small and medium-sized concerns have a hard struggle to keep things moving at all. In prices the comparison is on much the same scale—the big people are getting their demands in full, while the little makers are fighting one over the other to save themselves from individual losses. "To him that hath shall be given"—an axiom as invariably true nowadays as when first uttered. There is no likelihood, so far as we can ascertain, that the makers will alter list prices at the approaching quarterly meetings, and even if an alteration to the extent of 10/ should be declared in either direction, I do not suppose the general state of matters would be largely affected thereby. List prices of finished iron have had their day, and cannot possibly regain their one-time universal sway. The race is nowadays not only to the swift but to the strong, and the swift and strong man pushes his business as he thinks best, without any reference to what other people may be doing. The only exception to this might occur at the very top of an abnormally high market, when manufacturers would gladly shelter behind a "list" quotation.

SOUTH WALES AND MONMOUTHSHIRE

are still quiet, and are not sending off much iron on foreign accounts. Last week's shipments of iron, &c., included 264 tons from Rhymney to Christiana, 420 tons of rails from Guest & Co. to Port au Prince, 100 tons pig from Guests to Antwerp, 41 tons of rods and bars from Dowla to Lisbon, 80 tons of rods from Llynvi to Lisbon, 85 tons of hoops from Messrs. Stallybrass & Co. to Olan, 430 tons of tin from Messrs. Edwards for Lisbon. The quantity exported from Newport was 2490 tons to various destinations. Around Swansea the steel works are busier, and the tin plate makers are understood to intend to restrict the output individually, although two or three houses have failed to put themselves within the full terms of the agreement, which decided in favor of a restrictive policy from June 29th. At present prices are quite steady.

THE METAL MARKETS

are very uninteresting, prices being just maintained by the languid and spasmodic jerks of the London and output buyers.

The Ironmonger reports: "Copper has not been very strong, legitimate large buyers being still, apparently, reluctant to come forward with the considerable commissions they are popularly supposed to have in reserve. General prices are: Chili bars, £63. 10/; Wallaroo, £73; Burra, £70. 10/; English cake and ingot, £68. 10/; sheets, £73 @ £74. A new Australian copper, called cobar, is in the market, and is said to contain 99 per cent. of pure copper. Tin has not shown any symptoms of recovery on the whole, although there have been exceptional instances in which some little advance has been insisted upon and secured. Current prices run at £61 @ £61. 10/ for good Straits and Australian, £64 for Banca, £65 for English ingots, £66 for English bars, and £68 for good refined. Tin Plates are unequal, but in a general way may be said to be in fairly good demand at steady quotations, notwithstanding the hazy state of the agreement for commencing a restricted output on the 29th inst. The probabilities appear to be in favor of the continuance of the present mode of working, but there is, nevertheless, a chance that pretty much the same result will be attained by reason of the recent considerable influx of orders. Some of these commissions are understood to have been placed in South Wales at as low as 15/ per box, and in one or two

INDUSTRIAL ITEMS.

NEW HAMPSHIRE.

The Moulton & Ranlet car shops at Lacombe are busy. Two fine passenger coaches have just been completed for the Boston and Lowell Railroad, and the foundries are turning out car wheels for various New England roads.

The annual meeting of the Underhill Edge Tool Company was held last week at the works, and officers were elected as follows: Directors, H. M. Goodrich, G. W. Underhill, James L. Pierce, J. G. Kimball and S. B. Rindge of Boston. C. B. Hill was chosen treasurer and clerk, and Col. Goodrich president. The affairs of the company are reported to be in a prosperous condition.

The Humphrey Machine Company, of Keene, have recently shipped a lot of barrel machinery to Germany on orders, and a set of clothes-pin machinery to the Provincial Reformatory of Canada. They are now making a 5-foot turbine water-wheel for John Chace & Son, of Webster, Mass., and a 5½ foot wheel for the Richmond Paper Mill, at Lowell.

VERMONT.

The Central Vermont Railroad Company are manufacturing at their shops in Rutland six passenger cars for the New London Northern road, of which they hold a lease, to take the place of those burned on that road last spring. The first one has been sent away, and is said to be one of the finest passenger coaches ever produced in New England. About 20 extra men are now employed in the shops, mostly on this work.

MASSACHUSETTS.

Two massive locomotives, Nos. 179 and 180, were sent from the Taunton Locomotive Works to the Union Pacific Railroad week before last.

The Athol Machine Company have elected these officers: Directors, D. W. Houghton, W. D. Smith, L. S. Starrett, George T. Johnson, D. A. Newton and A. Bangs, of Athol, and A. W. Goodman, of North Dana; treasurer, J. S. Farmer; secretary, D. A. Newton. The affairs of the company are in excellent condition.

The Taunton Iron Works have made a profit during the past year. The directors have been instructed to appoint some one of their number to countersign or indorse all notes and checks of the company. The following officers have been elected for the ensuing year: Directors, John R. Williams, William H. Phillips, John H. Eddy, Job G. Luskomb, George M. Woodward—the latter in place of Job M. Leonard, declined. Wm. H. Phillips was elected treasurer and John R. Williams president.—*Commercial Bulletin*.

NEW YORK.

The Sharon Valley Furnace, we learn, will soon go into blast. A new hearth is to be put in at an early date.

The shops of the Malleable Iron Company Works, Sharon Valley, closed last Saturday for two months. During the two months vacation all needed repairs will be made.

The lead manufactory of S. G. Cornell & Son, Buffalo, is operated by a stock company, of which the president is A. P. Thompson; vice-president, S. Douglas Cornell; treasurer, Henry Spayth; secretary, Sheldon Thompson. The business consists of the manufacture of white lead, lead pipe, sheet lead and bar lead.

PENNSYLVANIA.

Messrs. Charles L. Bailey & Co., proprietors of the rolling mill at Harrisburg where the explosion occurred on the 25th of June, have received compensation from the Hartford Steam Boiler Inspection and Insurance Company to the amount of \$9500. Immediately after the explosion Mr. J. M. Allen, president of the insurance company, visited the mill, went over the ground, satisfied himself that his company were liable under the policy held by the mill owners, and within four days of the accident they received a check for the amount stated. The adjustment of the matter was perfectly satisfactory to all parties, and reflects credit upon the Hartford Company.

During the past few days a number of orders have been received at the Baldwin Locomotive Works, insuring a busy summer. Among the most recent orders are the following: Buffalo, New York and Philadelphia Railroad Company, one consolidated engine; for a Georgia railroad, one passenger and one freight engine; New York Elevated Railway, 10 passenger engines; Morgan's Louisiana and Texas Railroad, two freight engines; two narrow-gauge freight engines for the Tomah Railroad, of Illinois; one freight engine for the Bethlehem Iron Company, and one separate motor for the Hamilton and Dundas Street Railway Company, of Canada.

The remodeled Moslem Furnace, owned by Leibbrandt & McDowell, of Philadelphia, will have a capacity of 185 to 200 tons per week.

After an uninterrupted run since the beginning of last December, the P. & R. Rail Mill was stopped on Saturday last for the purpose of cleaning boilers and repairing machinery and furnaces, &c. The mill will again be started up on Wednesday, the 10th of July.

Perrotet & Hoyt, Columbia, builders of blast furnaces, rolling mill and gas works apparatus, are running full time.

Keystone Furnace No. 1, owned by Bushong & Bro., has gone into blast again. This furnace was out of blast ten weeks for repairs. The product of the Keystone Furnace has been sold up, and the additional product has also been sold.

Stewart's rolling mill No. 3, South Easton, has resumed operations.

It is stated that the Erie Rolling Mill will go into operation in a short time.

The stove foundry of Orr, Painter & Co., Reading, closed on Wednesday, the 3d inst., and the suspension will last for three weeks.

No. 2 Furnace of the Bethlehem Iron Company, South Bethlehem, the lining of which had fallen in, has again started.

The Bessemer rail mill at the Pennsylvania Steel Works, Harrisburg, shut down on the evening of the 3d for the purpose of making necessary repairs.

Clark, Reeves & Co. have secured the contract for half a mile of the Metropolitan

Elevated Railroad of New York, and work upon the same is now being carried on in the new mill.

We clip the following from the *Sharon Herald* of the 5th inst.: For the week ending June 29 at the Western Iron Company's Works, the puddle mill was the only one that made a full week double turn; the guide mill was on double turn, but the roller on the night turn was off three turns by sickness, so the mill lost three turns; hoop, bar and sheet mills single turn; nail factory and plate mill off; chain factory working on stock. Blast Furnace No. 2 is making in the neighborhood of 30 tons a day of good mill iron. Nothing done yet on repairing No. 1. At the New Mill, nail plate, nail factory, single turn; guide mill, double; that is all that were on. It was rumored on Saturday that the puddle mill would go on Monday of the present week, but the dampers are down as yet. Keel Ridge Furnace is working off steadily, receiving limestone, and likely to keep on. Arrangements, it is said, are made to pay the employees the back pay by Wednesday, which, if done, will no doubt facilitate the resumption of business. The Stewart Furnace No. 1 is working up to an average of 40 tons a day, Bessemer; still shipping iron a trifle faster than it is made. The Middlesex mill worked seven furnaces five days, six heats a day; stopped on Saturday to repair boilers and other necessary things; they may not start for a couple of weeks, or until the houses of chips have ceased falling. Both blast furnaces doing well, and no talk of blowing out. Greenville Mill on all but the puddling department.

PITTSBURGH AND VICINITY.

Messrs. Moorhead & Co.'s iron mill, at Soho, resumed operations last Friday morning on large orders received from California.

Lewis, Oliver & Phillips, the American Iron Works, and the Anchor Nail Works, all South Side establishments, resumed operations last Monday morning.

The partnership of Caughey & Hailman having been dissolved by the death of the latter, the business is continued by John A. Caughey and J. F. Robinson, under the firm name of Caughey & Robinson, at the same place, 115 Water street, Pittsburgh.

The Edgar Thomson Steel Works, Pittsburgh, are soon to be supplied with a 20-ton trip hammer.

The lamp chimney factory at Ravenna, Ohio, operated by Pittsburghers on the co-operative principle, has been shut down for repairs, but will be started again on the 1st of August.

The committee appointed by the creditors of Reese, Graff & Woods to investigate their affairs, report the following summary of their assets and liabilities:

Assets.	
Real estate and improvements.....	\$513,058.45
Book accounts, bad.....	200,033.40
Stock, per inventory.....	84,653.17
" in Grafton Iron Co.....	30,000.00
" in Great National Oil Co.....	1,249.00
Book accounts, good.....	32,285.15
Bills receivable.....	8,299.70
Cash.....	400.52
Total.....	\$869,981.40

Liabilities.	
Stock account, capital.....	\$400,000.00
Bills payable.....	450,991.36
Accounts payable.....	42,371.17
Bond and mortgage.....	5,965.66
Total.....	\$900,328.20

The Sable Iron and Nail Works, Pittsburgh, are shut down to prepare for stock taking.

The McKinney Mfg. Co., Hamilton, Ohio, are building large works at the corner of Ridge and Rebecca streets, Fifth ward, Allegheny, for the manufacture of strap, T and butt hinges.

WEST VIRGINIA.

Work was to be resumed at the Benwood Nail Factory last Monday.

The La Belle Glass Works have shut down for the usual summer vacation, which will probably not be for more than three weeks.

OHIO.

The King Bridge Company, of Cleveland, are busy on contract work. About 120 men are employed.

The heaters and rollers of Brown, Bonnell & Co., Youngstown, resumed work Monday morning, the 24th ult., the difficulty having been amicably settled.

Lamson, Sessions & Co., at their bolt and nut works near the Atlantic and Great Western station, are fairly active. One hundred and twenty-five men are employed.

Newton & Cox, Cleveland, are working their full complement of men on twist drills, reamers, &c. They are also building for the Telegraph Supply Company, of Cleveland, a milling machine of the largest size and first-class.

The Klotz & Kromer Machine Company, of Sandusky, are contemplating the establishment of an agricultural implement factory for the manufacture of their Hero mower and reaper, rakes, &c., at Bellevue. Their machine shops at Sandusky will be carried on as usual.

At a meeting of the directors of the Cherry Valley Iron Company, held in their office in Leetonia, Ohio, E. J. Warner, Esq., was re-elected president and general superintendent, and Charles N. Schmick secretary and treasurer.

The Toledo Saw and File Works, E. G. Peckham, proprietor, have plenty of orders, and this year's trade is about twice the volume of that of last year. They have lately finished a large concave saw for the Van Wert Stave Company, the order for which had been sent to three other factories and could not be filled.

The Telegraph Supply Company, of Cleveland, are so crowded with orders for Brush electric light apparatus, for the illumination of mills, depots, factories, &c., that they have been compelled to run day and night, and are now arranging for a factory four times the capacity of their present one.

Arms, Bell & Co.'s works, at Youngstown, are now idle to enable the proprietors to take the old foundation from under the engine and put in a new one, and to raise the boilers. They will also begin at once building an addition for a warehouse, the present warehouse to be filled with additional machinery.

The Revolving Scraper Company of Columbus are now manufacturing a fine contractor's plow as a companion to their revolving scraper, which is highly spoken of. This company report frequent inquiries for their goods from Central and South America, and have made recent export shipments to England, Germany and other foreign countries. Their patent folding garden barrow is very popular on account of its convenience for packing for shipment.

Mr. R. B. Green & Co., about June 1st, commenced operations in the manufacture of boilers of all kinds, at No. 88 East Front street, Cincinnati. They are at this time quite busy, having about 20 boilers to complete between now and September 1. They are now putting in a set of rolls 7 feet 4 inches in length for rolling boiler iron. These are said to be the largest rolls used in the city for that purpose. They also build the Whitwell hot-blast stoves, and attend to all kinds of work pertaining to the erection of blast furnaces. They will largely increase the present capacity of their works during this year in the way of tools of the most approved patterns.

The following items are from the *South Cleveland Advocate* of June 29th: The past week has been a very unfortunate one around the mill works for break-downs, but we are pleased to state that none are of a very serious nature. A new carbonator is now lying in the wire mill yard. It is to take the place of the old one which is defective, and will probably be placed in position this week. A new muffler is being erected at the north end of the wire mill. There are already seven mufflers in constant operation, still wire accumulates, and in order to keep up with the work it was found necessary to erect another muffler. A large force of men are now employed building it. The Cleveland Rolling Mill Company are now shipping daily on an average 285 boxes of No. 30 spool wire for binding grain, 10 spools in a box, making 2850 spools, each spool weighing 18 pounds. The quantity shipped every day, Sundays excepted, measures upward of 2500 miles in length.

They have a new machine for puddling iron down at Youngstown, the invention of Rev. Mr. Capin, a Presbyterian minister. Brown, Bonnell & Co. are trying experiments with it and claim that it has developed some good features.

WISCONSIN.

The Cream City Iron Works Company of Milwaukee have just shipped four coke-separating machines of their manufacture to Liverpool, England.

GEORGIA.

Cherokee Furnace, Cedartown, Georgia, blew in Saturday, 6th inst. The management intend to make a long blast, they having provided the facilities for supplying plentiful stacks of ore and charcoal, among the latter being a tram road to their bed of brown hematite iron ore, two miles from the stack. The purpose is to produce No. 1 foundry and car-wheel metal.

KENTUCKY.

Messrs. B. F. Avery & Sons' plow works at Louisville started up on Monday, the 24th ult.

Messrs. Dennis Long & Co. are shipping large quantities of pipe, and are running full time, netting 80 tons of pig metal per day.

Messrs. Bridgeford & Co., stove manufacturers, at Louisville, started in on the fall run at Monday. Most of the other stove men go in about the same time.

The Louisville Car Wheel and Railroad Supply Company's orders for the six months ending June 30 were 50 per cent. greater than for the same period last year.

INDIANA.

The Ohio Falls Iron Works, New Albany, are running full time on large orders for bar iron.

The New Albany Nail Mill is making full time, single turn, and have orders ahead sufficient to run them for some time.

Messrs. Charles Hedgwall & Co., of New Albany, are at work on contracts for furnishing machinery for eight steamboats.

The Porin and Gaff Manufacturing Co., of Jeffersonville, are using the new foundry built for them by the State, they being the lessees of the prison labor. They now have capacity in their immense works for 1000 men.

The Ohio Falls Car Company, Jeffersonville, are at work on a large number of passenger coaches. The work done at these works is not surpassed by anything produced in the country, as the three sleepers recently sent the Alabama and Great Southern Railroad will testify.

Rude Bro.'s agricultural works, at Liberty, Ind., were destroyed by fire early last Sabbath morning. Loss \$20,000.

MICHIGAN.

The following, from the *Marquette Mining Journal*, is a statement of the lake shipments of ore and pig metal in gross tons for the season up to and including Wednesday, June 26th:

FROM MARQUETTE.	
Rolling Mill.....	7,125
Lake Superior.....	34,665
Mitchell.....	4,195
Edwards.....	4,428
Republic.....	71,984
Champion.....	18,781
Keystone.....	779
Total.....	279,043

FROM L'ANSE.	
Michigan.....	10,336
Stewart.....	1,130
Total.....	11,466

FROM ESCANABA.	
Jackson.....	10,878
South Jackson.....	4,195
Cleveland.....	7,668
Angeline (hard).....	10,656
(hematite).....	1,393
Barnum.....	8,432
Saginaw.....	24,599
Salsbury.....	13,528
Palmer.....	3,294
Michigan.....	5,575
Superior (hard).....	5,630
Emmett.....	2,683
McComber.....	2,683
Winthrop.....	1,419
Total.....	149,540

Pig Iron.	
Carp River Furnace.....	1,557
Pioneer Furnace.....	2
Total.....	1,559

Quartz.	
Carp River Iron Co.....	199

Foreign Hardware in Birmingham.

A correspondent of the *Ironmonger*, writing from Birmingham, says: Besides American goods, locks, axes, hay forks, reapers, &c., which are imported into the Midlands chiefly through the agency of Alfred Field & Son, a large and increasing business is done through Birmingham in French, Swiss and Belgian hardwares and general ironmongery, under the auspices of the Franco-Belgian Hardware Company. The staple articles are steel goods; manufactured chiefly of Sheffield steel by Peugeot Frères, and perhaps the most curious fact in connection with this trade is that Sheffield is one of the best markets for these goods. Plane irons and chisels, for instance, of French manufacture are being sold there now in enormous quantities, and a still larger trade might be done in them if the French manufacturers would consent to impress their goods with the names of English firms. An order for 3000 dozen was offered on this condition the other day, but, to their credit be it said, Messrs. Peugeot declined to entertain it. Band saws and small vices of French make are in growing request, not only in this country, but in the United States, where English goods of a kindred character cannot obtain a footing, and the English orders for counter mills, cat and bean crushers, coffee roasting, grinding and making machines are so numerous that it is scarcely possible to keep pace with them. Among other novelties lately introduced, which appear to be taking a firm hold of the English market, are cheap wooden mouse traps, retailed at 1/ each, but supplied to the trade at 6/ a dozen. The disproportion between the wholesale and retail price of most of the French goods, it may be observed, is much greater than in corresponding classes of English goods. Factors are taking just now considerable quantities of an ornamental drawing-room hand bellows of Swiss make, composed of green leather, with light wood and bamboo framework, which is retailed at 10/ the wholesale price being 6/. One of the cheapest articles in the market, perhaps, is a Belgian six-chamber revolver of excellent design and fairly good workmanship, which is freely offered at 4/9, and which would be generally accounted cheap at 10/ retail. Enamelled ironware of French make is successfully competing in price against English enamelled hollow-ware, and French tinned iron spoons and ladles are freely sold even in Birmingham.

The American Locomotives in Russia.

A correspondent of the *Journal* of the German Railroad Union wrote from the Prussian Baltic port, Pillau, under date of March 19:

The steamer Timur has just arrived with 26 locomotives from the Baldwin works in Philadelphia for the Krusk, Kharsov and Azov road and the Oriel Grailai road. At the same time 14 American mechanics arrived in the same ship to erect the locomotives that they may be set at work at the earliest possible moment. We are expecting another steamer, the Bacchus, with the other 14 locomotives. The rapidity of construction of these locomotives is remarkable.

The order was put on the order book Dec. 17, 1877. At the end of four weeks four locomotives were ready; at the end of the fifth week, 10; during the sixth 11 were finished, and in the seventh week the whole order was executed. When the order was received at the works about 1000 men were employed; this number was increased to 2400, and the most of them worked no more than the legal ten hours per day in order to fill the order within the time agreed upon. The transport over the ocean from Philadelphia to Plymouth lasted 16 days; from Plymouth to Pillau, six days. Now the locomotives are rolling over the road to Wirballen (the Russian frontier); they are to be completely erected and tested and delivered to the Russian agent. While I am writing the work of erection is going forward swimmingly; in about two weeks from to-day it will be finished.

The well-founded fears due to the present political complications may have had no little influence on the really astonishingly rapid execution of this order and also on its transmission, since in the case of an unholy war between England and Russia the locomotives could not have reached the latter country, and would even have fallen into the hands of the English. To the unwearied, industrious workmen on that side of the ocean the warmest thanks of a Russian patriot are expressed herewith. Should these lines come before the eyes of any one of them, may he consider it a moral duty to deliver to his comrade the warmest thanks and greetings from distant Russia for American industry and energy, both of which will always stand high in our opinion and incite us to emulation.

The Sutro Tunnel.—The Virginia (Nev.) Chronicle says: Ground was broken for the Sutro Tunnel on the 19th of October, 1869.

The work has therefore required eight years, eight months and ten days to complete. The process was very slow at first, all drilling having been by hand; but in the spring of 1874, experiments with a Burleigh drill having demonstrated the advantages to be derived from the use of that machine, a carriage capable of supporting six of those drills while at work was made, and on the 22d day of June, 1874, four were started. The progress was now much more rapid than ever before in the history of tunneling in the world, and on Aug. 7, in the same year, two more drills were put to work. This made six altogether. From that date the average progress was over 300 feet per month up to April, 1877, when the header having entered the broad Comstock mineral belt, the heat became so intense that two drills had to be taken off the carriage. From that day the average monthly progress did not exceed 250 feet. Work has been continued uninterruptedly from the time that ground was broken until to-day, but at times only two men were at work in the tunnel. The greatest progress was in December, 1875, when the heading was advanced 417 feet, and the least in October, 1870, when it was only advanced 19 feet. The total length of the tunnel, as stated in the official chart

published last September, is 20,170 feet. The tunnel being connected with the Comstock workings, the next move of Mr. Sutro will doubtless be to start north and south drifts to connect with all the mines on the lode. The work has cost nearly \$4,000,000.

Marketing in Rome.—Mr. C. C. Fulton,

writing from Rome to his paper, the *Baltimore American*, says: The Roman markets are all out in the open air, and the provisions for sale are in the smallest possible amount, just as much as the vender can bring on his own head or on the back of a donkey. A great many venders perambulate the streets, and their cries are shrill and varied. Some idea may be formed of the poverty among the people by the fact that a chicken is cut up and sold in quarters. You can buy a leg or a wing, or a breast, or take the whole bird at your option. We have watched a butcher selling a half pound of meat, and the fruiterers selling a half pound of cherries. Some of our housewives who take half a dozen baskets with them to market would be surprised to see heads of families carrying home their marketing in a small lunch basket, with one or two small bunches of cherries on top. The provisions for sale are spread out in baskets on the pavement, there being no market houses, though there is an abundance of small vegetable and fruit stands in all parts of the city, each with about as much of a stock on hand as could be packed in a wheelbarrow. In fact, Rome can be said to have no markets, all manner of provisions being peddled around.

Getting a Pullman Car to Paris.—A

correspondent writing from Paris says: The French are slow; they are slow without malice aforethought, but that does not alter the fact. Commissioner McCormick has spent the better part of a week in the vain attempt to induce them to consent to the dispatch of a Pullman car to Paris which has long been lying at the port of entry. The railway company declined to take charge of it without a special permission from the government. The Paris police declined to let it go through the streets, even at night, to the Exhibition, without a special sanction from the prefect. The prefect, after long negotiations, gave his sanction for the transit through Paris, but the government had not decided on the transit through France before the local concession was lost through mere lapse of time. The prefect had named three days as the extreme limit of indulgence; the government came in on the fourth day. The fifth was lost in endeavors to persuade the prefect to renew his part of the favor, and when all seemed ready the railway company had a fresh qualm of the mind, and wanted another signature before it would venture to start the coach. The drama has gone no further as yet.

Mining and Metallurgy in Algiers.—

The demand for ores sufficiently pure for the manufacture of Bessemer pig has been a great stimulant to the development of mining in Algiers, as the rise in the mining industry of iron has had a tendency to carry the other metals with it. The most ancient and most flourishing mine is that of Mokta-el-Hadid, which furnishes hundreds of thousands of tons per annum to the furnaces of France, England, Belgium and Germany. From 170,000 tons in 1867 the production of ore (the average percentage of which is 60) has gradually risen to 428,000 tons in 1874. Since then the general depression in the iron trade has caused the output to decrease somewhat. Three important mines are located in the province of Alger, the Zaccar-Rharbi, the Gouraya and the Oued-Messlemoun. In the department of Oran the Camerata and Tafna companies have during the last years risen very rapidly. The Beni-Saf ores, worked by the Soumah Company, are hematites, the percentage of iron of which varies from 58 to 60.

A Prosperous Southern Cotton Factory.—

The annual report of the management of the Augusta, Ga., cotton factory for the fiscal year ending June 15 shows an exceptional prosperity, especially in these times, when so many Northern mills are closing or failing. During the year 770 looms turned out 14,777,337 yards of cloth. The mill used up 11,819 bales of cotton at an average cost of 10.02 cents per pound. The total sales of goods were \$885,033.41. The number of operatives employed regularly averaged 640, to whom was paid in wages \$162,000. The mill paid four dividends of 2 per cent. each, liquidated \$700.00 of its bonded debt, and increased its surplus fund by \$25,470, the latter now being \$256,020. The Augusta factory, during the 20 years of its existence, has never failed to pay a quarterly dividend but once.

The experience of Americans abroad shows

them that while some things are managed better there than here, there are others, and those among the most practical, in which the customs of this country are better. A lady writing from England describes the tribulations of an American gentleman in search of a scrap-book and mulligan bottle. At the stationer's where he bought the book mulligan was not to be had. At the place where he bought the mulligan he could buy no brush, and the result was that in buying eight shillings' worth of small articles he expended twelve shillings in cab fares. This mode of subdividing business is unquestionably good—for the cabmen. And the exact and well-defined lines between different tradesmen may work better for them in a small way than for the purchaser.

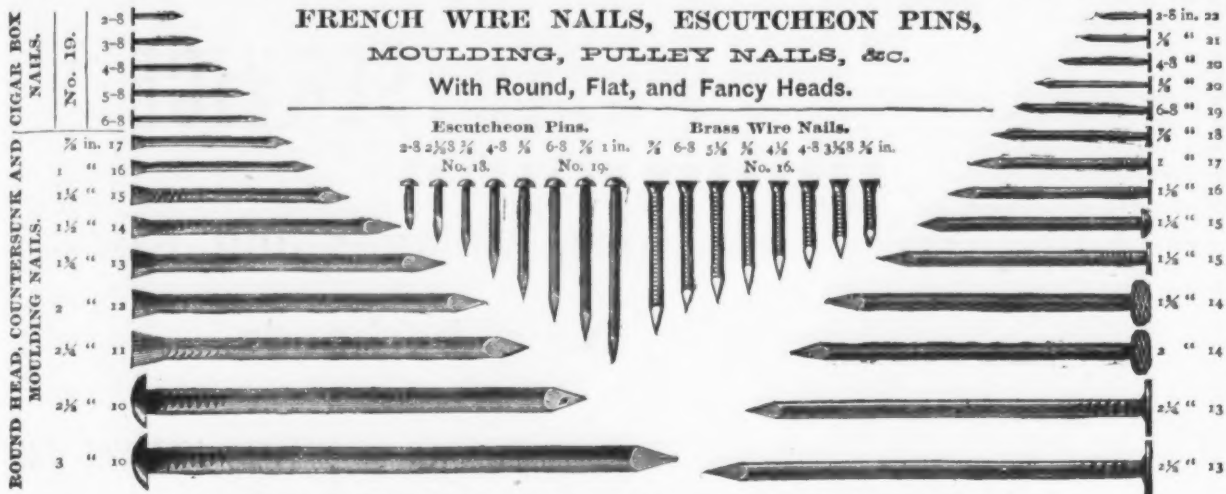
The earlier smiths and artists made most

of their bronze work with the hammer. Their furnaces were heated by wood or charcoal, and the metal was slowly smelted, so that it was tough and dense. If allowed to cool slowly it became very hard, if more quickly it would be softer; and, as some bronzes would have small quantities of other metals in them as well as tin, the workman could keep some for tools, knives, daggers and swords, and other kinds for armor and ornaments. Sword-blades were hammered to the sharpest cutting edge, the metal being laminated and tempered so as to be equal to good blades of iron and steel.

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Any Kind of Wire Nails made to order from Description, or Samples.

American and Swedes Iron Tacks,

Tinned, Leathered and Large Head Carpet Tacks, Finishing Nails, Black and Tinned Trunk Nails, Miners' Copper, Gimp, Lace and Brush Tacks, Hungarian, Chair, Cigar Box and Barrel Nails, Glaziers' Points, Iron, Steel, Copper and Zinc Shoe Nails, Patent Improved Brass Shoe Nails, Heel and Toe Plates, Steel Shanks, and Fancy Head Nails, Silver or Japanned Lining and Saddle Nails, A full assortment always on hand at salesrooms, for immediate delivery if required. Odd and Irregular Sizes made to order or cut from sample at short notice. Send for Price List.

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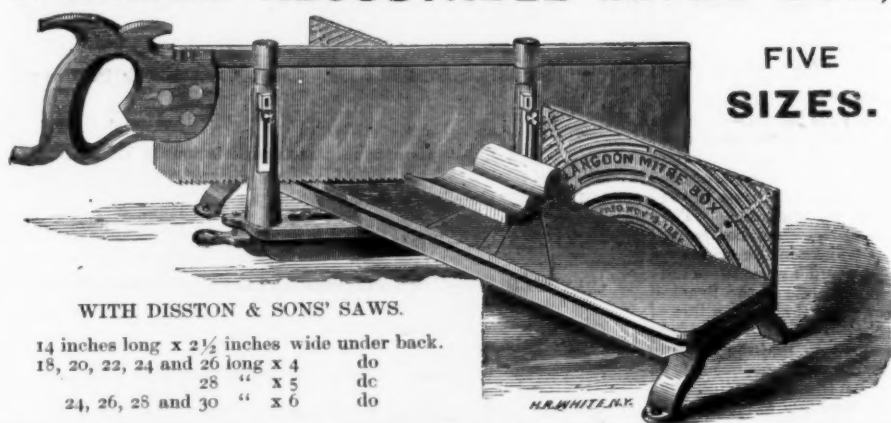
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Sole Owners and Manufacturers of the

LANGDON ADJUSTABLE MITRE BOX,

FIVE SIZES.



WITH DISSTON & SONS' SAWS.

14 inches long x 2 1/2 inches wide under back.
18, 20, 22, 24 and 26 long x 4 do
28 " x 5 do
24, 26, 28 and 30 " x 6 do

All parts of each size made to interchange. (issue 1877) sent when desired.

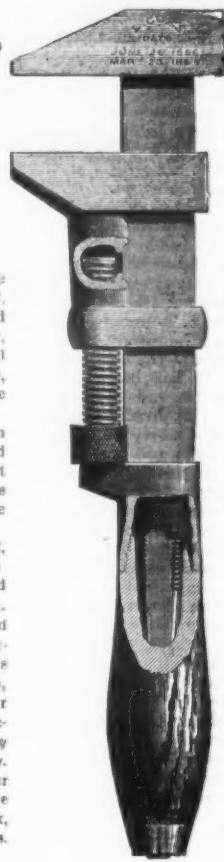
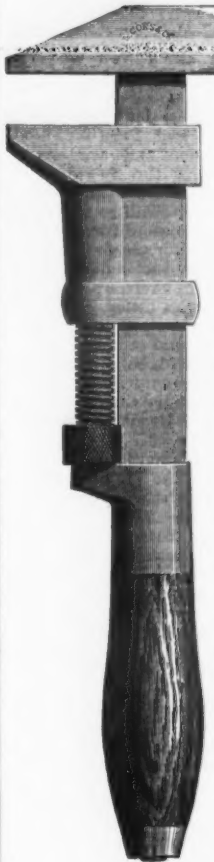
Five sizes of Mitre Boxes. Eleven sizes of Saws. Dealers wishing to advertise furnished with electrotypes without cost.

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Genuine Improved Patent

Manufactured by

L. COES & CO.,
Worcester, Mass.



We invite the particular attention of the trade to our New Straight Bar Wrench, widened, full size of the larger part of the so called "reinforced or jog bar." Also our enlarged jaw, made with ribs on the inside, having a full bearing on the front of bar (see sectional view), making the jaw fully equal to any strain the bar may be subjected to.

These recent improvements in combination with the nut inside the ferrule firmly screwed up flush, against square, solid bearings (that cannot be forced out of place by use), verifies our claim that we are manufacturing the strongest Wrench in the market.

We would also call attention to the fact, that in 1869 we made several important improvements (secured by patents), on the old wrench previously manufactured by L. & A. G. Coes which were at once closely imitated and sold as the Genuine Wrench by certain parties who seem to rely upon our improvements to keep up their reputation as manufacturers, and although the fact of their imitating our goods may be good evidence that we manufacture a superior Wrench, we wish the trade may not be deceived on the question of originality. Trusting the trade will fully appreciate our recent efforts, both in improvements on the Wrench and in the adoption of a Trade Mark, we would caution them against imitations. None genuine unless stamped.

"L. COES & CO."

Warehouse, 97 Chambers St., & 81 Reade St., N. Y.
HORACE DURRIE & CO., Sole Agents.



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These nails are made of the best brands of NORWAY IRON, and are guaranteed to be equal to any in the market.

NATIONAL HORSE NAIL CO.,
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With Flat, Round, Oval, Depressed, Screw and Fancy Heads.

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HOG RINGER
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Only double Ringever invented. The only Ring that will effectively keep Hogs from rooting. No sharp points in the nose.



EAGLE BILL
CORN HUSKER
Is the best Husker in the market. Farmers say it is the best. Use no other.



BROWN'S
HOG AND PIG
RINGER AND RINGS
Only single Ring in the market that crosses on the outside of the nose. No sharp points in the nose to keep it sore.

Ringers, 75c. Rings, 50c. 100. Holders, 75c. Huskers, 15c.
CHAMBERS BERING & QUINLAN, Exclusive Manufacturers Decatur, Ill.

A New Method of Detecting Overstrain in Iron and Other Metals.

Professor Robert H. Thurston, of the Stevens Institute of Technology, lately read a valuable paper on a new method of detecting overstrain in metals, and on its application in the investigation of the causes of accidents to bridges and other constructions, before the American Society of Civil Engineers. We make the following extracts:

It has been shown by the writer* and by other investigators that when a metal is subjected to stress exceeding that required to strain it beyond its original apparent or "primitive" elastic limit, this primitive elastic limit becomes elevated, and that strain diagrams obtained autographically, or by carefully plotting the results of well-conducted tests of such metal, are "the loci of the successive limits of elasticity of the metal at the successive positions of set."[†]

It has been shown by the writer also that, at the successive positions of set, strain being intermitted, a new elastic limit is, on renewing the application of the distorting force, found to exist at a point which approximately measures the magnitude of the load at the moment of intermission.[‡]

It has been still further shown by the writer and by Commander Beardslee, U. S. N., by direct experiment in the Mechanical Laboratory of the Stevens Institute of Technology and at the Washington Navy Yard, that the normal elastic limit, as exhibited on strain diagrams of tests conducted without intermission of stress, is exalted or depressed when intermission of distortion occurs, according as the metal belongs to the iron or to the tin class. § This elevation of the normal elastic limit by intermitting strain is, as has been shown, variable in amount with different materials of the iron class, and the rate at which this exaltation progresses is also variable. With the same material and under the same conditions of manufacture and of subsequent treatment, the rate of exaltation is quite definite and may be expressed by a very simple formula. The writer has experimented with bridge material, and Commander Beardslee has examined metal specially adapted for use in chain cables, for which latter purpose an iron is required, as in bridge building, to be tough as well as strong and uniform in structure and composition. The experiments of the latter investigator have extended to a wider range than have those of the writer, and the effect of the intermission of strains considerably exceeding the primitive elastic limit has been determined by him for periods of from one minute to one year. ¶ From a study of the results of such researches and from a comparison with the latter investigation, which was found to be confirmatory of the deduction, the writer has found that, with such iron as is here described, the process of exaltation of the normal elastic limit due to any given degree of strain usually nearly reaches a maximum in the course of a few days of rest after strain, its progress being rapid at first and the rate of increase quickly diminishing with time. For good bridge irons the amount of the excess of the exalted limit, as shown by subsequent test, above the stress at which the load had been previously removed, may be expressed approximately by the formula:

$E' = 5 \log. T + 1.50 \text{ per cent.}$; in which the time, T , is given in hours of rest after removal of the tensile stress which produced the noted stretch.

Thus it is seen that a metal once overstrained carries, permanently, unmistakable evidence of the fact, and can be made to reveal the amount of such overstrain at any later time with a fair degree of accuracy. This evidence cannot be entirely destroyed, even by a moderate degree of annealing. Often, only annealing from a high heat, or reheating and reworking, can remove it absolutely. Thus, too, a structure broken down by causes producing overstrain in its tension members, or in its transversely loaded beams (and, probably, in compression members—although the writer is not yet fully assured of the latter), retains in every piece a register of the maximum load to which that piece has ever been subjected; and the strain-sheet of the structure, as strained at the instant of breaking down, can be thus laid down with a fair degree of certainty.

Here, then, when the work above detailed shall have been properly complemented with experimental determinations of the behavior of all the materials of general use in construction, can be found a means of tracing the overstrains which have resulted in the destruction or the injury of any iron or steel structure, and of ascertaining the cause and the method of its failure, in cases frequently happening in which they are indeterminate by any of the usual methods of investigation.

The fact of the normal variation of the elastic limit, as change of form progresses under gradually increased load, has been well established by the experiments of Hodgkinson, Clark, Mallett, and other English investigators; by Tresca, particularly, in France; by Werder and Bauschinger in Germany, and by Beardslee, the writer and others in the United States.

The exaltation of the series of normal limits so produced still further, by the intermission of strain, is also a matter of no uncertainty as to its character, although much more study is needed to determine the modifying effects of time of intermission on metals of the two great classes and of differing composition. The method above outlined of determining the extent of previous overstrain may therefore be expected to have many useful applications.

This paper is not presented as a perfectly satisfactory statement of definite facts from which absolutely reliable conclusions can be drawn. The whole subject is deserving, however, of very careful and very extended

* See Trans. Am. Soc. C. E., 1874, et seq., Journal Franklin Institute, 1874; Van Nostrand's Electric Engineering Magazine, 1874, &c.

† On the strength, &c., of Materials of Construction, 1874, Sec. 20.

‡ On the Mechanical Treatment of Metals. Metallurgical Review, 1877; Engineering and Mining Journal, 1877.

§ Trans. Am. Soc. C. E., 1877.

¶ The result of this investigation is completed, and will be presented to the President of the United States by the United States Board appointed to test iron, steel, &c.

* The writer has found by subsequent tests that transverse strain produces the same effect upon the E' limit for tension.

experimental investigation, and the writer has been able to obtain but a small amount of satisfactory definite information in regard to it as yet.

The same method may sometimes be used to ascertain the probable cause of a boiler explosion by determining whether the metal has been subjected to overstrain in consequence of overpressure. The causes of accidents to machinery may also be thus detected, and many other applications will suggest themselves to every engineer.

Call for Proposals on a New Government Fire-proof Building.

The plans for the new building for the Bureau of Engraving and Printing have been undergoing revision and are nearly ready to be submitted to the Secretary of the Treasury for his final approval. When this is done advertisements will be made for proposals to furnish the material and do the work. The excavations for the foundations will be begun as soon as the contracts are made. The building will probably be ready for occupancy ten months hence. It is to be of brick and without any great pretensions in the way of external ornamentation, though as its position will be conspicuous the designs have been drawn with a view to combine grace and symmetry with simplicity and solidity. The north front of the new building will be on a line with the Agricultural Department and the Smithsonian building, and as viewed from the White House it will appear to be midway between the Washington monument and the Agricultural Department. The ground between the Treasury, the White House and the new State Department on the north, and the monument and the new Bureau of Engraving and Printing on the south, comprising about half of a square mile, will be cleared of the foundries and shops which now occupy a portion of it, and the whole will be laid out in drives and walks as a public park.

The whole appropriation for the proposed new bureau is \$300,000. This sum is considered rather small for the construction of a fire-proof building of the size and character required, but the Secretary of the Treasury expresses a determination to finish the work without exceeding the appropriation. All contracts for brick, stone and other materials to be used in construction are to be made with the original producers of these articles, and thus the profits usually gathered by middlemen will be saved to the government. When this building is finished an annual saving of more than the interest on the amount expended in its construction will be effected through the superior conveniences for performing the work of the bureau which it will afford. At present three steam engines, attended by three sets of engineers, firemen and assistants, are required to drive the machinery and do the work of the bureau. In the new building the whole work will be done with one engine, and in this item alone \$10,000 will be saved annually.

The new building will have a frontage on the north of 224 feet and on the east of 178 feet, with ample room for further extension should a necessity for it ever arise.

The Warwick Furnace.

The Pottstown (Pa.) Ledger says: The unprecedented and phenomenal product of the Warwick Furnace at this place elicits favorable and extended comment. When we first chronicled a weekly yield of 300 tons it was variously received among ironmasters, some deeming it an error of the types, others a fable, and many more that the furnace was pushed and largely burdened with scrap. But the clock-like regularity of its working, the steady increase and uniform quality of production have, since the opening week, been maintained. And now that the working of the furnace is no longer an experiment we feel justified in giving publicity to the details of management and yield.

Up to Saturday last, the 22d inst., the furnace has been in blast 25 weeks, producing 7636 tons, or an average of over 305 tons weekly. Of this 6840 tons were Nos. 2 and 3 mill iron and 52 tons mottled iron, and in the beginning of the blast 744 tons Nos. 1 and 2 foundry iron. The heat of the blast varies from 800 to 900 degrees, generally averaging about 850 degrees, the minimum being 700 and the maximum 1000 degrees.

To refute the assertion that to the use of scrap iron the immense yields are due, we have but to say that not a pound has been bought since the present blast commenced, and that the scrap daily made is not all consumed, there being a larger amount now on hand than in December last. The mixture of ores used is not rich in metal, the yield varying from 40 to 45 per cent. of iron. From this can be readily computed the large amount of material to be melted daily to produce the enormous returns. Of the stock used 60 per cent. consists of the Boyertown and Seasholtzville ores mixed by the Warwick Iron Company, and to the use of which the previous disastrous chills were attributed.

Of late the furnace has maintained a high standard of production, the workings from April 7 to June 22 representing a weekly average of 334 tons. The highest yield was for the week ending June 8, when 345 tons were produced; in the week following 343 tons were obtained, and stoppage in that week of three hours alone prevented 350 tons being placed to the credit of the furnace.

The plant is daily visited by persons of prominence in the manufacture of iron, and the universal expression of opinion is that the unexampled development of the Warwick Furnace is solely due to the careful management and high scientific acquirement of the manager, Mr. Edgar S. Cook. The results reached by Mr. Cook are not from haphazard ventures, but from patient, laborious research and tireless energy and application.

Professors George J. Brush and Edward S. Dana have discovered in Fairfield county, Conn., six new and well-defined species of phosphate minerals, two of which they fully describe in the last number of the *American Journal of Science*. Eosphorite occurs in prismatic crystals belonging to the orthorhombic system. It shows a nearly perfect

macro-diagonal cleavage, the hardness being 5; specific gravity, 3.134; luster, vitreous to subresinous; color, pink, yellowish-white to white; streak, nearly white; fracture, sub-conchoidal; formula, $Al_2P_2O_8 + 2H_2R_2O_3 + 2a q$. The second mineral, triplodite, belongs to the monoclinic system. Hardness, 4.5 to 5; specific gravity, 3.697; luster, vitreous to greasy adamantine; color, yellowish to reddish-brown, occasionally hyacinth red; streak, nearly white; fracture, sub-conchoidal, transparent to translucent. The formula is $(Mn, Fe)_2P_2O_8 + (Mn, Fe)(HO)_2$.

The Roar of the Metropolitan Railway.

Mr. Edison has been investigating the reason for the great noise caused by trains passing over the Metropolitan Elevated Railway. He stated the other day that he had not yet found out all the sources of the noise produced by the trains, and until he had fully determined what the causes of the noise were, he could not decide upon remedies. He was making an instrument, which would be finished in a day or two, by which he could determine the character of the sound vibrations, and thus get at the causes of the offensive roar. This instrument Mr. Edison described. It consists in part of a funnel to collect and condense the sound vibrations. At the small end of the funnel is a diaphragm which is made to vibrate by the sound. A cylinder similar to that used in the phonograph is placed near the diaphragm. About the cylinder is wrapped a piece of paper which has been blackened by being held over the fumes of burning charcoal. A straw is fastened to the funnel diaphragm in such a manner that the point falls on the blackened paper. As the cylinder is turned, the sound vibrations are traced by the straw on the paper in such a manner that they are plainly visible. The instrument is called the "phonograph." By its use records of sound vibrations for any desired length of time can be easily made. These records, Mr. Edison believes, will enable him to determine the causes of the peculiar roar produced by the trains of the Metropolitan Road. He intends to use the phonograph both in the cars and on the ground under the track.

One great source of noise has already been discovered by Mr. Edison to be the vibration of the iron lattice stays of the girders. These stays cross each other, but are not joined where they cross. At every passage of a train these stays vibrate with so much force that the strength of a man's hand is not sufficient to keep them steady. Their vibrations are rendered very sonorous by the ties of soft wood on which the rails are laid. The entire road is thus made to be an immense sounding apparatus, and might, Mr. Edison says, be compared to a piano if the noise produced were not so inharmonious. By fastening the lattice stays where they cross, their vibrations will be checked in a measure and the noise lessened. A change from spruce and pine ties to oaken ties would also have an effect in lessening the noise.

An Accident at the Erie Basin.—One of the large dry docks at the Erie Basin, at Red Hook Point, South Brooklyn, was the scene of a singular accident at 2 o'clock Saturday afternoon, which came near resulting in the death by drowning of 30 workmen. The docks, which are owned by a stock company, are the largest private docks in the country. They are built of stone, and are constructed in the same manner as the one at the Brooklyn Navy Yard. For some time past a large number of men in charge of engineer Emory, have been engaged in making extensive repairs to the docks, and on Saturday they were working in the bottom of the largest one, which is 440 feet long, 90 feet wide, and between 40 and 50 feet deep, and from which the water had been pumped for the purpose of repairs and the large gates closed to prevent the water from flowing in. Engineer Emory was walking along the bottom of the dock near one of the gates, noticed a bubbling of water at his feet, and becoming alarmed, shouted to the men to hurry out of the dock, at the same time making a rush for the top himself. The men clambered up the stone steps with all possible haste, and had no sooner reached the top than the huge gate burst in, followed by a terrific rush of water, and in an instant the dock was filled with water, followed by several thousand feet of lumber and timber. So great was the force of the rushing water that some of the pieces of timber were hurled 40 feet in the air. Nothing but the prompt action of engineer Emory and the precipitate flight of the men prevented the almost instant death of all the workmen at work in the dock. As it was no lives were lost.

Decline of Building Operations in Philadelphia.—The Philadelphia *North American* of the 5th inst. says: A decrease in the number of new buildings was to be expected, and we are not disposed to regret it. The growth of Philadelphia was stimulated to an abnormal degree by the Centennial, and the great progress of all building enterprises in that year was necessarily followed by a stagnation which might have been much more marked. The first half of the year shows an increase of 40 per cent. in the number of new buildings, the number of alterations being about the same. We hardly understand, however, why the falling off should have become so much greater as the year advanced, the decline for June being more than 60 per cent. Nevertheless this is more apparent than real, for the greatest depreciation has been in dwelling-houses. The number of permits issued for June compares very favorably with last year, except in that class of buildings, the number of factories being more than last year.

The wheelwright establishment of Place, Creamer & Co., at Port Chester, N. Y., was destroyed by fire Sunday morning. The building was worth about \$3000, and the stock of carriages and materials and tools on hand \$4000. There were also a number of vehicles in the establishment belonging to customers. The building was partially insured, but there was no insurance on the contents. The fire is supposed to have been the work of an incendiary.

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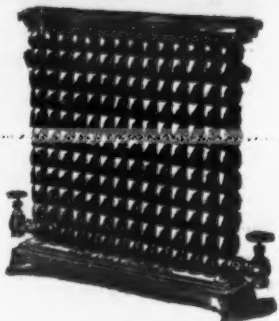
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Globe Nail Co., Boston, Mass.	8
EP Horse Nail Co., Cleveland, O.	39
Northwestern Horse Nail Co., Vergennes, Vt.	25
Platt & Co., Buffalo, N. Y.	31
Putnam Nail Co., Neponset, Mass.	32
Stetson N. Jr., 71 Pearl, N. Y.	39
Horse Shoes, Makers of.	
Boston Rolling Mills, 17 Batterymarch, Boston.	5
Burden Iron Works, Troy, N. Y.	4
Rhode Island Horse Shoe Co., Providence, R. I.	4
Schoenberger & Co., Pittsburgh, Pa.	4
Hydrants, etc.	
McLean John, 50 Monroe, N. Y.	37
Hydraulic Jacks.	
Dudgion Richard, 24 Columbia, N. Y.	40
Insurance, Boiler.	
Hartford Steam Boiler Inspection & Insurance Co.	41
Iron Brokers.	
Boynton Geo. A., 70 Wall, N. Y.	4
Edgington & Co., Philadelphia, Pa.	4
Hatry A. G., Pittsburgh, Pa.	4
Hazard T. D., 204 Pearl, N. Y.	4
Iron, Charcoal, Warm or Cold Blast.	
Quay John W., 98 William, N. Y.	4
Iron Commission Merchants.	
Adams Hugh W., 55 Pine, N. Y.	32
Low S. B., Chattanooga, Tenn.	6
Spencer Collins, St. Louis, Mo.	5
Iron, Pig, Importers of.	
Williamson James & Co., 60 Wall, N. Y.	4
Iron Dealers.	
Abes Brothers, 120 South, N. Y.	4
Bonelli, Botaford & Co., Youngstown, O.	4
Borden & Lovell, 70 and 71 West, N. Y.	4
Carmichael W. R., 125 and 127 Cedar, N. Y.	4
Cooney Daniel F., 28 Washington, N. Y.	4
Huerstel G., 30 Market Slip, N. Y.	4
Fuller, Lord & Co., 125 Greenwich, N. Y.	4
Harrison & Gillson, 224 to 226 Water, N. Y.	4
Jackson & Chase, 225 and 227 Franklin, N. Y.	4
Judson R. F., 457 and 459 Water, N. Y.	4
Kane C., Pittsburgh, Pa.	4
Ogden & Wallace, 85, 87, 89 and 91 Elm, N. Y.	4
Pierson & Co., 24 Broadway, N. Y.	4
Pullman & Co., Westley, Philadelphia, Pa.	4
Quincy John W., 98 William, N. Y.	4
Richards D. W. & Co., 55 Mangin, N. Y.	4
Wallace Wilson & Washington streets, N. Y.	4
Warner A. B. & Sons, 28 and 29 West, N. Y.	4
Williamson James & Co., 60 Wall, N. Y.	4
Whitney A. R. & Bro., 58 Hudson, N. Y.	4
Iron, (Manufacturers Agents).	
St. Louis Stamping Co., St. Louis, Mo.	5
Iron, Manufacturers of.	
Boston Rolling Mills, 17 Batterymarch, Boston.	5
Bradley, Reis & Co., 21 Cliff, N. Y.	5
Burden Iron Works, Troy, N. Y.	5
Collins H. E. & Co., Pittsburgh, Pa.	5
Houdette & Ellis, Boston, Mass.	4
Kirkpatrick, Beale & Co., Phila.	4
Leonard John, 450 and 451 West, N. Y.	4
Oxford Iron Co., 81 Washington, N. Y.	4
Phoenix Iron Co., 410 Walnut, Philadelphia.	4
Rhone Iron Co., Chattanooga, Tenn.	6
Rowland James & Co., 220 N. Delaware, Phila.	42
Rowland Wm. & Harvey, Philadelphia.	42

SNOW'S PATENT CAST IRON RADIATOR.

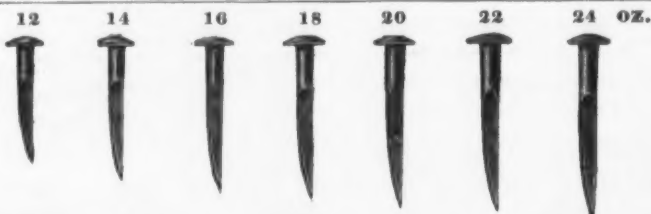


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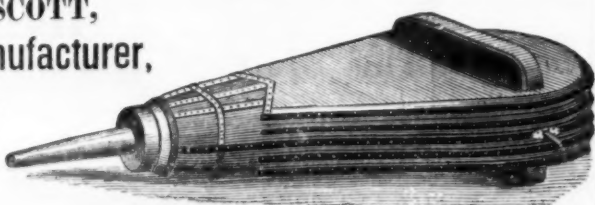
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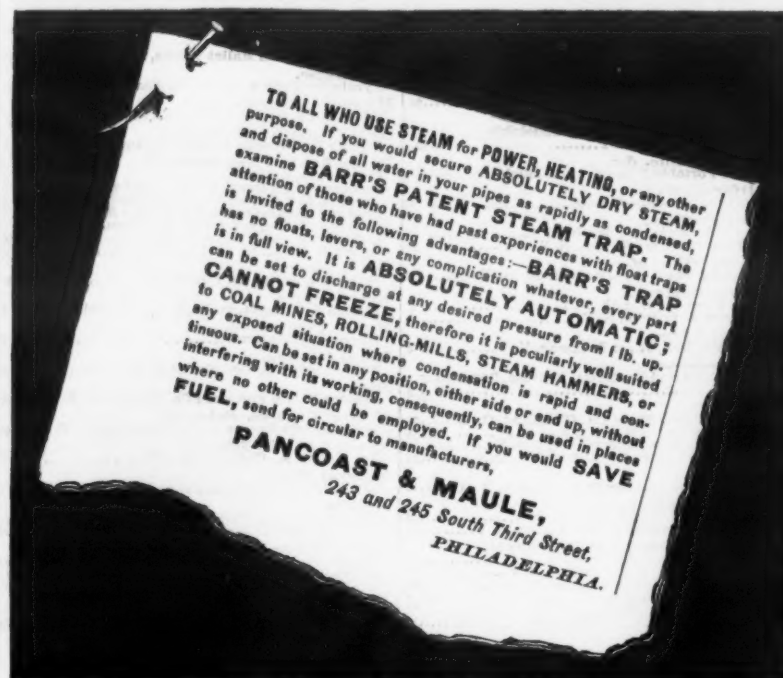
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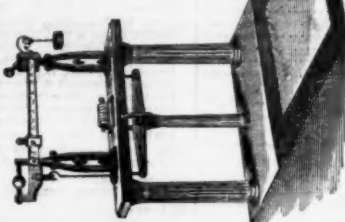
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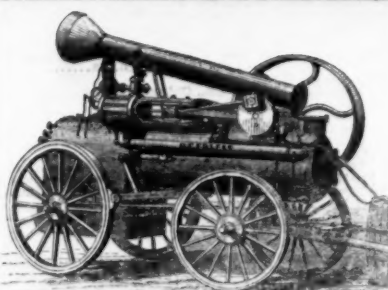
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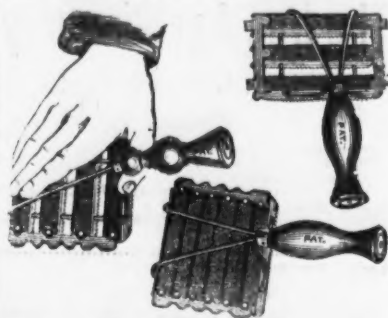
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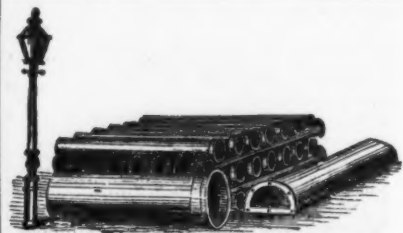
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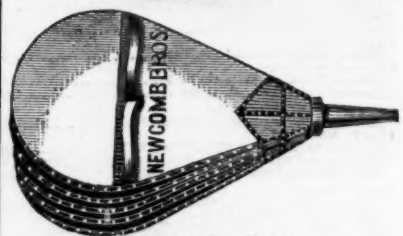
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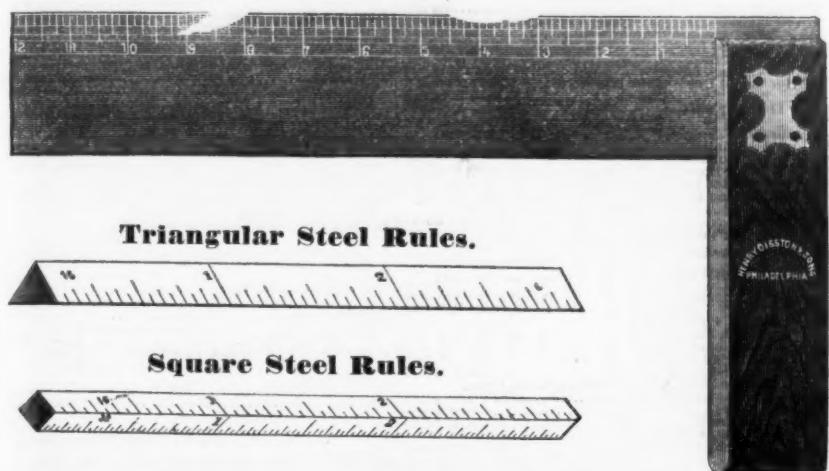
Keystone Saw, Tool, Steel & File Works,

FRONT AND LAUREL STREETS, PHILADELPHIA.

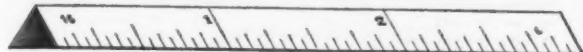
Branch Works, Tacony, Philadelphia.

Branch House, Randolph & Market Streets, Chicago, Ill.

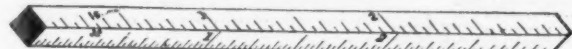
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Triangular Steel Rules.



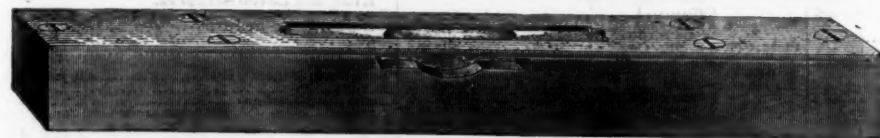
Square Steel Rules.



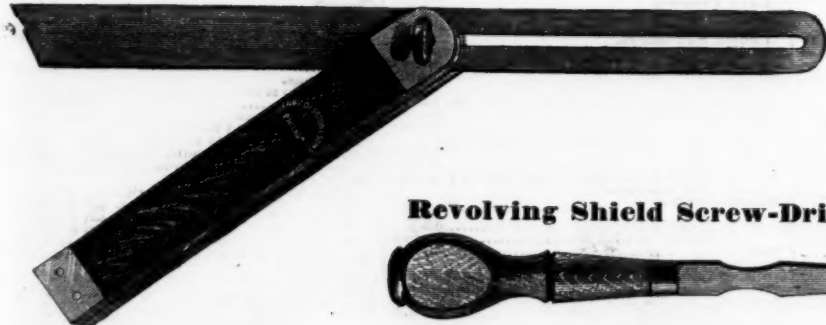
Plumb and Levels.



Machinists' Levels.



Bevels.



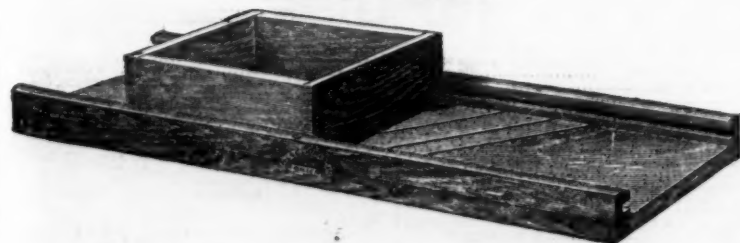
Revolving Shield Screw-Drivers.



The Excelsior Wrench and Screw-Driver.



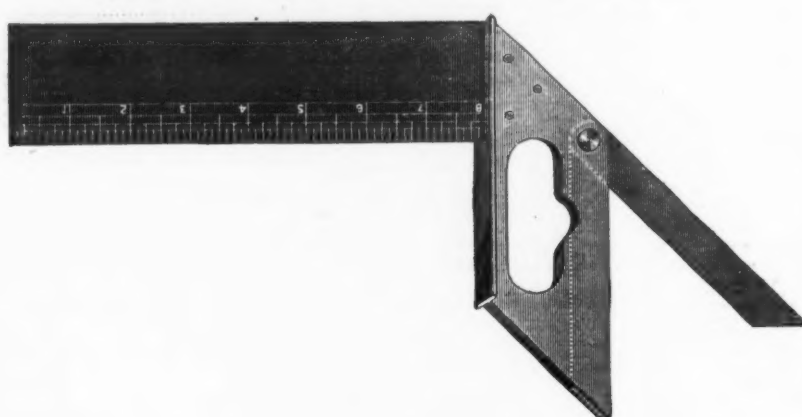
Crout Cutters.



Gauges.



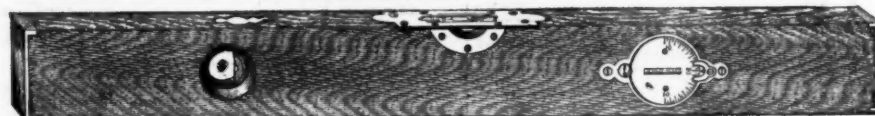
Improved Iron Frame Mitre and Square.



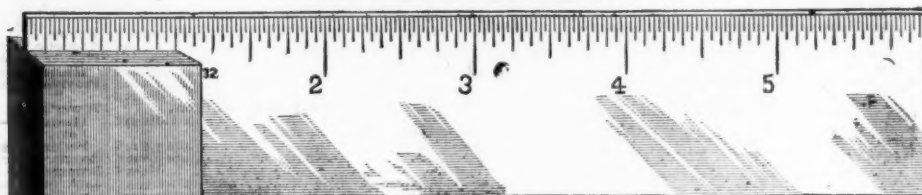
Machinists' Standard Steel Rules.



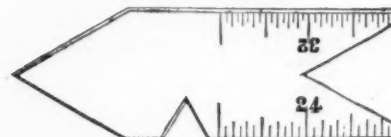
Graduating Level.



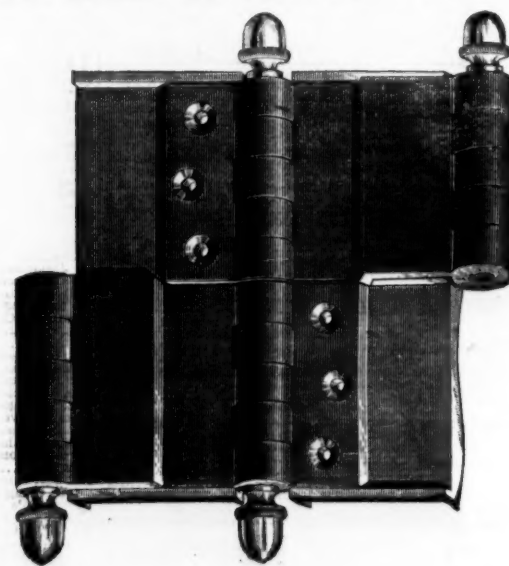
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15 x 26 to 24 x 30.....	12.25	10.75	9.00	
20 x 28 to 24 x 30.....	13.00	11.50	9.75	
26 x 37 to 20 x 30.....	14.50	13.25	10.75	
26 x 46 to 30 x 50.....	15.00	14.00	11.25	
30 x 52 to 30 x 54.....	16.25	14.50	12.00	
30 x 56 to 30 x 58.....	17.25	15.50	13.50	
34 x 58 to 34 x 59.....	18.25	17.25	15.00	
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11 x 14 to 16 x 24.....	13.75	12.50	11.75	10.50
13 x 22 to 20 x 30.....	17.25	15.75	14.00	
15 x 30 to 24 x 30.....	19.75	17.25	14.50	
20 x 28 to 24 x 30.....	21.00	18.50	15.75	
26 x 35 to 26 x 36.....	23.25	21.25	17.25	
26 x 46 to 30 x 50.....	24.00	22.50	18.00	
30 x 52 to 30 x 54.....	25.75	23.25	19.25	
30 x 56 to 34 x 58.....	27.75	25.00	21.75	
34 x 58 to 34 x 59.....	29.25	27.75	24.00	
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No. 5 will cut 7-16 Iron
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Along, Nineteen Sizes.
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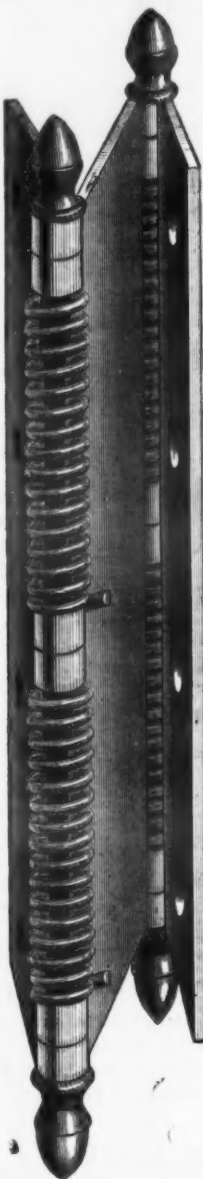
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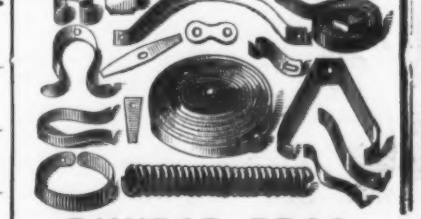
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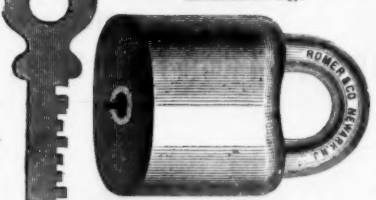
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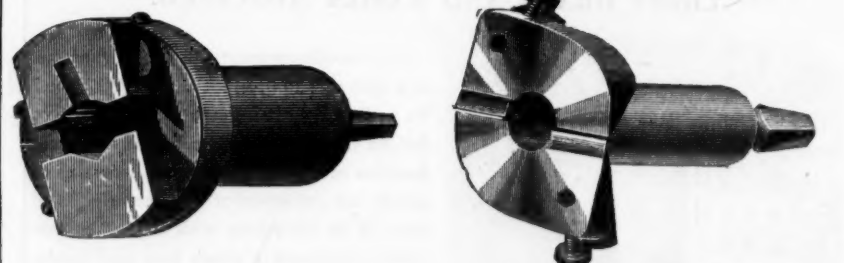
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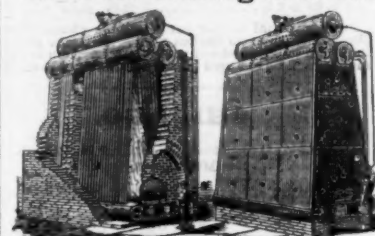
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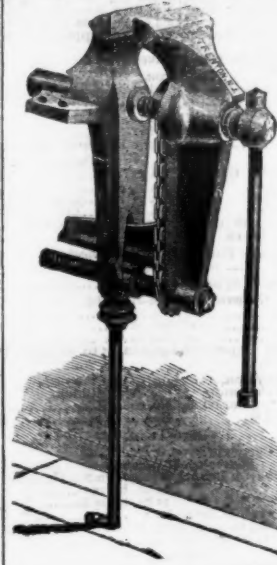
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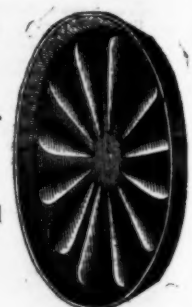
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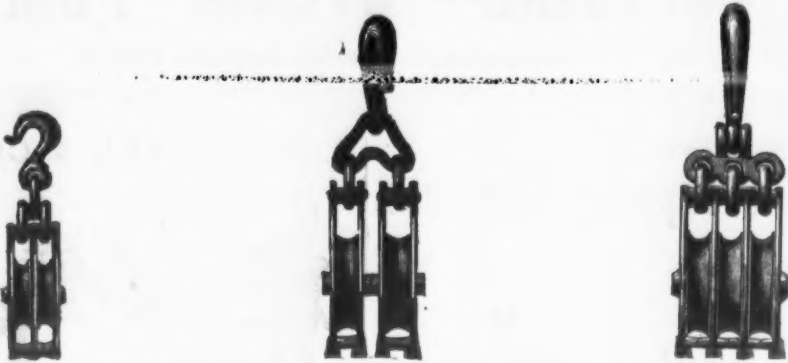
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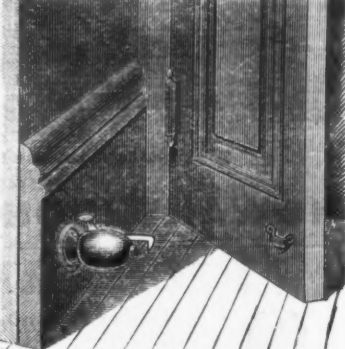
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Machinery, &c.

THE JUDSON GOVERNOR.

Reduced Price List,

FEBRUARY 1, 1877.

For dimensions of Governor, see Illustrated Price List.



THE JUDSON PATENT

Improved Steam Governor.

No Charge for Boxing or Cartage.

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Size, Inch.	Plain.	Bright Finish.	Extra for Speed.	Stop Valve.
1/2	\$16.00	\$18.00	\$1.00
3/4	18.00	20.00	1.00
1	20.00	22.00	2.00	\$5.00
1 1/4	23.00	25.00	2.25	6.00
1 1/2	25.00	27.00	2.50	8.00
2	31.00	33.00	2.75	10.00
2 1/2	36.00	38.00	3.25	12.00
3	40.00	42.00	3.50	14.00
3 1/2	45.00	47.00	3.75	16.00
4	50.00	52.00	4.00	18.00
4 1/2	55.00	57.00	4.50	20.00
5	60.00	62.00	5.00	22.00
5 1/2	65.00	67.00	5.50	24.00
6	70.00	72.00	6.00	26.00
6 1/2	75.00	77.00	6.50	28.00
7	80.00	82.00	7.00	30.00
7 1/2	85.00	87.00	7.50	32.00
8	90.00	92.00	8.00	34.00
8 1/2	95.00	97.00	8.50	36.00
9	100.00	102.00	9.00	38.00
9 1/2	105.00	107.00	9.50	40.00
10	110.00	112.00	10.00	42.00
10 1/2	115.00	117.00	10.50	44.00
11	120.00	122.00	11.00	46.00
11 1/2	125.00	127.00	11.50	48.00
12	130.00	132.00	12.00	50.00
12 1/2	135.00	137.00	12.50	52.00
13	140.00	142.00	13.00	54.00
13 1/2	145.00	147.00	13.50	56.00
14	150.00	152.00	14.00	58.00
14 1/2	155.00	157.00	14.50	60.00
15	160.00	162.00	15.00	62.00
15 1/2	165.00	167.00	15.50	64.00
16	170.00	172.00	16.00	66.00
16 1/2	175.00	177.00	16.50	68.00
17	180.00	182.00	17.00	70.00
17 1/2	185.00	187.00	17.50	72.00
18	190.00	192.00	18.00	74.00
18 1/2	195.00	197.00	18.50	76.00
19	200.00	202.00	19.00	78.00
19 1/2	205.00	207.00	19.50	80.00
20	210.00	212.00	20.00	82.00

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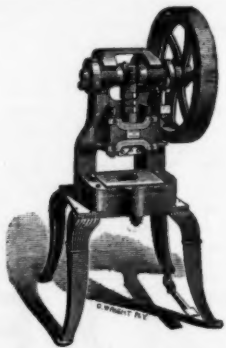


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BLISS & WILLIAMS,

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167 to 173 Plymouth St., corner of Jay, Brooklyn, N. Y., and Paris Exposition, 1878.

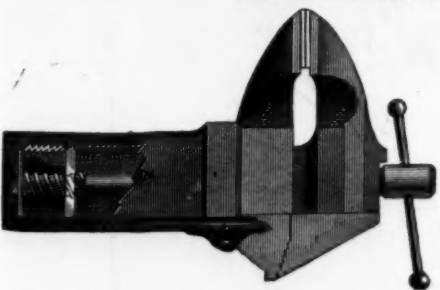
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Newspaper Directing Machines, &c.

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Machinery, &c.

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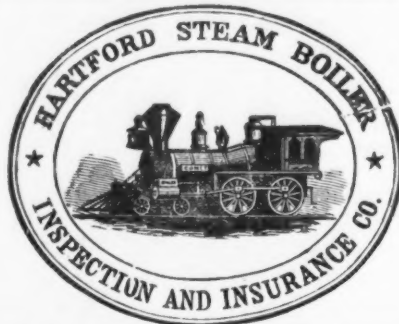
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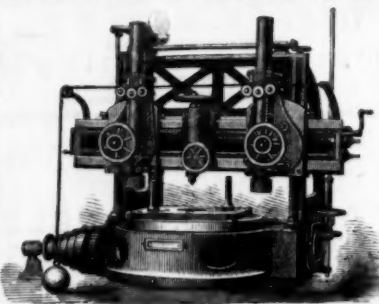
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Of recently improved construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.

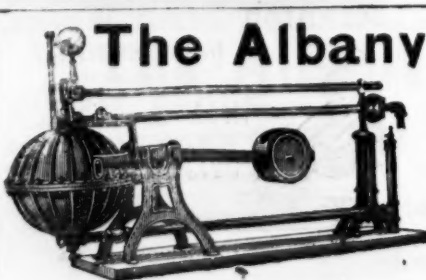
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Special Pulley Turning Machinery, Engine Lathes, Iron Planers, Universal Radial Drilling Machines, Hydrostatic Presses, Car Axle Lathes and Wheel Bore. Latest designs and patterns. Prices very reasonable.

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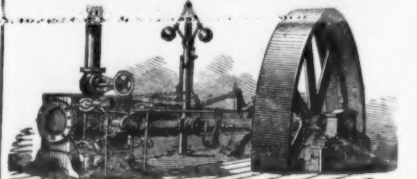


This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

Albany Steam Trap Company, Albany, N. Y.

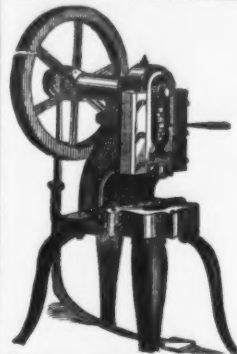
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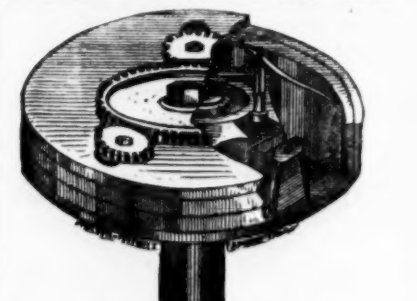
of 1877, of one horse-power, complete for \$25. 2 Horse Power.....\$25 1200 2 1/2 Horse Power.....\$30 1700 3 Horse Power.....\$35 2100 Can be seen in operation at my store. Send for descriptive circular and price. Address J. C. TODD, 10 Barclay St., N.Y., or Paterson, N. J.



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XXX Genuine	55c	C	17c
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Note: The above are my standard mixtures, and have given satisfaction wherever used, but I am prepared to make Anti-Friction Metal of any quality or mixture desired by the purchaser.

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SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

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We make Castings practically free from blow-holes, of steel which is as soft and as easily WORKED and WELDED as Wrought Iron, yet is STIFF, STRONG and DURABLE, with a TENSILE STRENGTH of not less than 65,000 lbs. to the square inch. In short, OUR CASTINGS UNITE THE QUALITIES OF STEEL AND WROUGHT IRON.

Wheels and Pinions, Dies and Hammer Heads, Engine and Machinery Castings of all descriptions, Railroad Frogs and Crossings, Plowshares, Moldboards and Landsides.

WE USE NO CAST IRON.

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A Substitute for Steel and Wrought Forgings.
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From 1/4 to 10,000 lbs. weight, solid, and true to pattern, of 3 times the strength of cast iron. Invaluable for Gearing of all kinds, Shoes, Dies, Hammerheads, Crossheads for Locomotives, etc. 12,000 Crank Shafts of this steel now running proved superior to wrought iron. Circulars and price lists free. Address: CHESTER STEEL CASTINGS CO., Evelina St., Philadelphia, Pa.

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Offers for the whole or part of this machinery will be received by

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NEW IMPROVEMENTS

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Cost One-third Less than

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Guaranteed.



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For connecting Shafting and Gearing.

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See cut of Elevator Hoisting Machine in issue of June 20, 1878, page 40.

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TRIAL OF THE IMPROVED LIGHTNING SAW.

The Emperor Dom Pedro, accompanied by Director General Goshorn, Superintendent Albert, and others, visited Machinery Hall, at the Centennial on the evening of June 28th. Among other things inspected, at the invitation of E. M. BOYNTON, of New York, they witnessed a trial of the *New Lightning Saw*, patented March 26, 1876. Two men, with one of these saws, cut off a sound log of gum-wood, one foot extreme diameter, in seven seconds, or at the rate of a cord of wood in five minutes. Messrs. Corliss, Morell, Lynch, and other members of the commission, witnessed the trial and timed the cutting. The Emperor remarked, That was fast, very fast cutting. Last evening the Emperor made another examination of the saw.—Philadelphia Press, June 30.

"BOYNTON'S SAWS were effectually tested before the judges at the Philadelphia Fair, July 6th and 7th. An ash log, eleven inches in diameter, was sawed off, with a four-and-a-half-foot lightning cross-cut, by two men, in precisely six seconds as timed by the chairman of the Centennial Judges of Class Fifteen. The speed is unprecedented, and would cut a cord of wood in four minutes. The representatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, England, and several other countries, were present, and expressed their high appreciation."

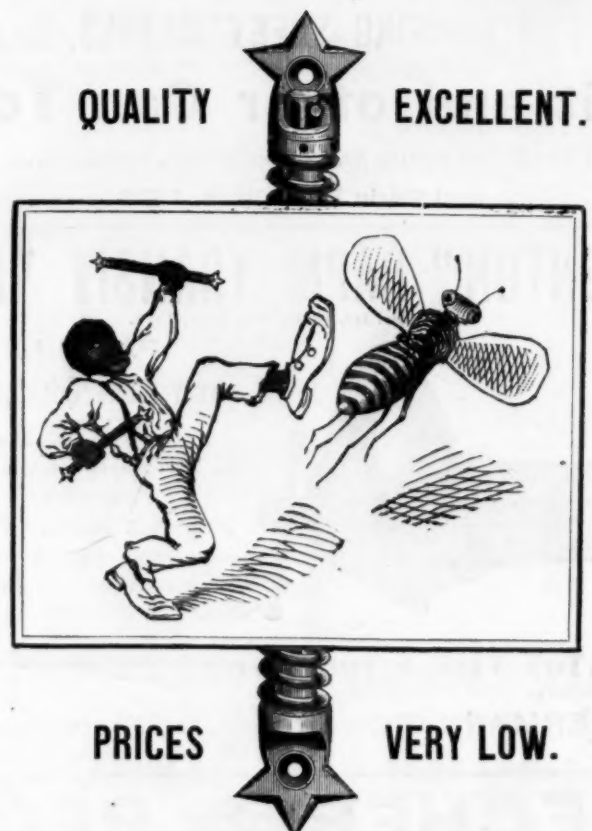
Received Medal and Highest Award of Centennial World's Fair, 1876.

\$1000 Challenge was prominently displayed for six months, and the numerous saw manufacturers of the world dared not accept it, or test in a competition so hopeless.

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QUALITY

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